

THE
GARDEN LOVER

R. L. H. BAILEY

The Background Books

THE GARDEN LOVER

THE BACKGROUND BOOKS

The Philosophy of the Holy Earth

THE HOLY EARTH

WIND AND WEATHER (verse)

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THE SEVEN STARS

THE HARVEST

THE GARDEN LOVER

THE GARDEN LOVER

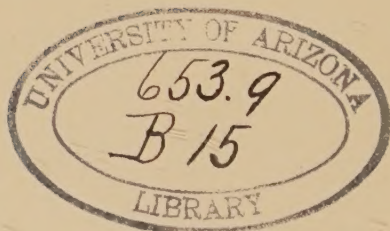
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1. *The Garden Lover*

IT had been a week of wonderful lectures on the theory and practice of gardening, and the time had come for questions. The first question, by one who had heard it all, was this: How do you propagate sweet-williams?

She wanted sweet-williams. She was entitled to have them. All the fancy plans and the painful elaborations were of no consequence as compared with this wish.

Yes, sweet-williams and all the other pinks, and bleeding-hearts, forget-me-nots, marigolds, pineys, blue-flags, petunias, mignonette, larkspur, rosemary, hoarhound, wormwood, butterbeets, snap beans, bread-and-butter onions, gooseberries, moss-roses and all the rest of them,—why not?

There was evidently frank attachment and old memories in these things and something personal and very close to the affections. Sometimes we feel that we must almost apologize for growing them now, so much has gardening become a phase of architecture on the one hand and of commerce on the other. They are good in themselves and without

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reference to any scheme, as dependable as anything ought to be, and carry the essence of simplicity; but perhaps we ought not to be simple and unpretending any more. I used to think that there is plain honesty in growing plants just because they are plants, but probably that notion is old-fashioned and I shall not mention it. I thought, also, that the real gardener gave more attention to growing his plants than to the perfecting of his scheme, but we shall let that pass also; and I shall not suggest that there may be conventionalities that may obscure the practice of simple gardening.

Yet many plant-growers would not sell a plant, but they would give away an armful of roots; the plants are too good to be sold. Within a few months I asked a nurseryman whom I visited why he did not list certain of the plants he had on his place; he replied he thought so much of them that he could not bring himself to make commerce of them. So there may be a few persons who will be patient with me if I make a book about gardeners and gardens. For some years I have had this inexpressible intention and have visited growers in many places and have indulged in a considerable correspondence to the end that I might apprehend the situation; and it so happens that my daily work brings me in unremitting contact with plants that are culti-

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vated both in the acknowledged garden and in the larger and more skillful operations of the open spaces. I was glad, two years ago, to respond to the request of the editor of *House and Garden* to prepare an article on the tendencies in horticulture, for it gave me an opportunity still further to test the sentiment of plant-growers and to extend my sources of information; and that statement is variously articulated in this first segment of my little book.

But that we may not be too much up to date, I mean to incorporate a few of the unremembered articles written when the years were green and which may therefore give an expression of another day when perhaps we were less sophisticated, even if I have forgotten, with the flight of time, the occasions for which some of them were prepared. Yet, the more important part of my intention has not been expressed heretofore, and the book is a connected comment on the passing day.

* * *

I like to think that the best gardeners are those who are least self-conscious. They devote themselves to the straightforward work of growing plants because they like them and without overmuch elaboration; and the plants are not then subordinate to artificialities and vogues, to vases and steps and dials and the

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other accessories that never grew from a cutting or a seed.

The growing of plants for the sake of the plants is the happy privilege of the amateur. I wanted to use the word *amateur* in the title of this book but feared that readers would think it meant persons not serious-minded or the tyro or novice or smatterer, and that they would pronounce it as if in rhyme with *expenditure*. So I chose the word *lover*, despite its connotations, remembering that *amateur* is the descendant of the Latin *amator*, the lover.

The plant-growing for interest and satisfaction is commonly known as gardening; the garden is a good old appurtenance of a home, and the name of it is a Saxon word that has come down with the race and has been associated from the first with the affections. The prouder word horticulture is the Latin equivalent, and may be supposed to represent the culture or ideas imported; but it suggests a home relationship, nevertheless, for a *hortus* is a garden, suggestive of an inclosure, as *ager* (whence the word agriculture) is a domain or a field.

In this book, therefore, we shall think of a wider field than the small domestic area habitually known as a garden. In this country we are fond of the word horticulture, and we probably speak as horticulturists more often than as gardeners. What may be the distinc-

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tions between the two I shall not undertake to explain precisely; I prefer that the reader make his own picture; but in due time shall state what may be the mark of a true horticulturist, and thereby we shall come at the gist of the problem.

* * *

A recent authoritative article on the tendencies in American horticulture discusses only the trade situation; the "tendencies" are correctly assumed to be commercial, lying in such fields as specialization, competition, advertising, coöperative marketing, cold-storage, prices. Ask the man on the street what are the rewards in horticulture and he will probably reply in terms of the money to be derived from it and he will include in the term "horticulture" only such crops or products as have a market quotation. He will think of orchard fruits moved in quantity, of cut-flowers grown by the acre, of truck-crops filling trains.

As in agriculture in general, the horticultural part of it is now largely visioned as a commercial undertaking only; its methods, and particularly the varieties of plants, must be standardized; products must be raised in quantity; the output must be reduced to rigid grades. What was formerly an occupation expressing the soul is now acquiring the hardness of industry in general; this is a real tendency. Let us

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hope that the man himself will not become standardized by the mere force of circumstances and imitation.

The rising commercial importance of these occupations is commonly assumed to be an indication of the progress in horticulture. This commercial advantage is well; it certainly is not to be disparaged. The commercial career is of course essential. Yet it must not be assumed that there is no other measure, or that the financial rewards to individuals are the most important ones. So dominant is the commercial growing of crops and plants that the other objectives are likely to be passed over as of little consequence: the growing of plants for satisfaction may not be subject for serious consideration by the public. And yet, merely as a commercial asset, the growing of plants for the love of it is of prime consequence to the plantsmen and seedsmen who supply the stock and the accessories.

The amazing development of quantity-production and standardization of products has brought vast changes in the horticultural field as well as in the mechanical industries. In most lines of endeavor the trend of events is to discourage the amateur (the lover) and to cause him to give up his personal product for the greater output, precision and profit of the machine and the managed industry. The current profit-sharing arrangements in factories

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tend directly to this result. Great plant factories now turn out almost identical specimens by the scores of thousands, in few varieties, and the sale of them by highly efficient methods has unified the trade and reduced the variables to the minimum. Purchases are standardized because the choice is reduced and limited.

It would seem that desires must of necessity be unified and that the old wish for diversity in plants must be eliminated by these processes. This is probably the case with the general purchasing public, who go to the market with no strong preferences and with little discrimination or preparedness. How is the amateur desire to be fed, and what is to be its future?

The amateur in gardening grows plants for the love and admiration of them. To him or her the interest lies in the individuality of plants rather than in sameness of specimens. Variety is verily the spice of life to him. This is necessarily the case with the amateur gardener, since plants are living growing objects and not manufactured articles, expressing the soil and the season and the general variable-ness of nature. Standardized productions lose interest from the very fact that they are standardized: the moods and variables of one's own life are not reflected in them.

This is not to deny the merit of standardized production in plants. High skill is developed in the growing of them and able managership

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is displayed. The grower is entitled to pride in his workmanship. The output is dependable. It is capable of definite quotation. The landscape planter can count on the quantity he needs for a given area and be certain of obtaining the desired effects. There is little loss or risk in the transactions and in the planting. He may project his design with confidence. The decorator may produce uniform results from the cut-flowers and accessories at his disposal, with the minimum of labor and uncertainty. To the grower, uniformity of product and quantity of production mean consolidation of forces, reduced costs, more expeditious transportation and marketing, more continuous relations with all branches of the trade, better service, more dependable use of capital, and therefore greater money profit.

Yet the amateur is the ultimate conservator of horticulture. On him rests the maintenance of the ideals. If gardening is to contribute great satisfaction to our people it must rest directly on the feeling for plants and recognition of the kinds; and this sentiment is stimulated by diversity and spontaneity rather than by uniformity and conventionality. As an educational and spiritual factor the plant is more significant than the blossom of it. One never knows a plant until one grows it and cares for it from first to last in all vicissitudes. The satisfaction of seeing a plant spring up, grow,

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produce its own kind of foliage, take its place among other plants, meet the days and seasons as they pass, is beyond all measure greater and more significant than the color-sensation produced by the flower or the fruit in a decoration. The purchased plant in full bloom or mature condition is not very close to one's affections, nor is it an object to be exhibited as one's own.

There is no danger that the amateur or plant-lover must pass, whatever may be the semblance of it for any moment. The amateur will persist as long as the mind craves variety in experience and as the seasons hold their charm. There is a strong reaction against commercial valuations of life. The home-making instinct persists in spite of all the efficient apartment-housing, as the suburban settlement testifies. The powerful garden-club movement is evidence; some of this movement, to be sure, may be only a social manifestation, but an important part of it is rooted in the wish for home and a garden. The more carefully planned and artistic homes of the present day demand it. The element of design, to which such effective attention is now devoted by so many persons competently trained, is giving form and added interest to gardens as long as it does not become the single motif,—that is, as long as the place remains a garden. The setting of the garden is often more important than the design. Let us admire Jonathan Swift's desire to have

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“a river at my garden’s end.” Setting and design together should make the perfect prospect.

This amateur interest reaches the “ultimate consumer” in plants. It is a background movement. I have written many persons recently, in many parts of North America, for opinions on these questions. The replies are varied and interesting, but practically all of them feel that the amateur is again in evidence. But it is a new kind of amateur. It is not so much the old-fashioned trained gardener as a host of householders who are searching for ways to express themselves joyously through their own efforts. While the interest is now manifest mostly in the women, we shall expect the men to share it as soon as it begins to give new joy to the home and as a proper literature develops.

It is now essential that we find ways of utilizing leisure. We express vast pride in the achievements of our labor, but it is the good employment of leisure that makes persons and peoples great. The processes of invention provide us with more leisure; so does the shortening of the working-day and the conservation of health, the accumulation of wealth and the reduction of poverty. But we have not developed commensurate ways to use the time and energy that we save. There is little moment in a shorter work-day if the remaining hours cannot be resourcefully employed. The wast-

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ing of time is more harmful merely than long labor. We are indeed proficient in devising ready-made entertainment and in hiring people to perform for us, and we run for cool weather when it becomes warm and hurry to warm weather when it becomes cool. But the real utilization of leisure is to have resources where one lives; gardening is one of these real resources.

* * *

Beyond commercial fruit-growing and flower-growing and trucking lies a vast field of human-interest in the companionable rearing of plants, all broadly within the field of horticulture. One may be an excellent horticulturist without ever having bartered a plant or a product; in fact, the best horticulturists, in the nature of the case, are not exclusive commercial men, and their number still is legion. The commercial enterprises are of course to be greatly stimulated; but the persons in these absorbing pursuits must recognize the larger desires in the background.

In truth we ought not to be obliged to contrast the commercial man and the amateur, for the former as well as the latter may be a lover of plants; yet so strong is the tendency of commercial production to reduce the kinds of plants that the producer loses his contact with variety and experiment and his interests

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become mainly routine and financial. There has been great change in these regards in the last score of years. I have seen men of sensitive response to plants go completely over into the hardness of mere trade and lose interest in any or all the varieties and kinds that are incapable of easy quantity-production or do not directly produce a profit. Many of the present plant-growers and tradesmen are not horticulturists. Recently I was asked by a large florist to look at a bench of pot-plants that had been sent in for the winter from private residences, to be kept while the owners were traveling. Not one of the twenty-five or thirty species was known to the florists of the establishment, and yet they were not rare plants. The habitual practice of attaching a price to every plant and of thinking it worth growing only when it receives that price, naturally eliminates much of the inspiring reaction we have so long associated with the horticultural pursuits.

While the tendency to reduce variety is marked amongst some of the older nurserymen, there is also an opposite movement; the latter will cater directly to the amateur. Most of the nurserymen who carry a considerable variety have more kinds of plants on their grounds than they list in their catalogues, and these kinds are available to the visitor. Surely we shall need both kinds of commercial plantmen

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and seedsmen, those who grow a small list in great quantity and those who carry a long list in relatively small quantities. Diversity is increasing in outdoor plants, and there were never so many species in cultivation in North America as at present.

Not all these plants are in the trade-lists of plantsmen nor are they known to florists. From the specimens sent me for name I am impressed with the species grown in the country that are unrecognized in commerce. These things are subjects of exchange from person to person, and the garden-clubs and other movements tend to distribute them. Some of them persist in old premises. Certain persons make special effort to import seeds of novel species; while the plants may not be sold, they are likely to pass from hand to hand. Botanic gardens and similar agencies become centers of interest for novelties. A good number of persons assemble large collections of special groups of plants and sell them without advertizing or issuing regular catalogues; at most they issue only lists. Many plantsmen have a good trade to persons who come to the premises to buy or who make inquiries from the suggestions of friends.

This background interest in plants not in the regular general trade is a reality and probably exerts more influence than we are aware. One is always surprised and pleased to come on such

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collections. Years ago I grew a large list of species of begonias, devoting a greenhouse to them; I have deplored the going out of the begonia, as only the florists' flowering kinds of the *Semperflorens* class are now commonly seen, and I had supposed that no large assemblage of species remains in this country; and yet not long ago I saw in California a larger and better collection of species of begonia than I had known in the country before. It is likely that such collections of special groups will gradually multiply; even as an amateur effort they are far and away more interesting and important than the blue-gardens and winter-gardens and perfume-gardens and all the other undertakings whereby we try to keep up with the vogues of the day.

Standing before garden-clubs in the cities one is likely to be impressed with the ennui, with the weariness of the effort to know what to grow and what it is proper to do with the garden. One may suggest the perennial interest that inheres in plants rather than in vogues, and may ask why there should be an effort to emulate or to outdo a neighbor or to win in a competition, and proposed that each member take up one group or kind of plant for special interest and study. The element of trial and experiment adds zest to a personal horticultural effort. One might grow all the kinds of zinnias, experiment with them, learn their requirements

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and merits; one thing would naturally lead to another in any effort that is founded on a reality. With another it might be phlox annual and perennial, and many species of phlox yet await satisfactory cultivation; or it might be pinks, or lupines, or lilacs or viburnums, or strawberries, or melons, or what you will. Sooner than one is aware, one becomes an authority on a group and opinions have value; from this point the progress is assured. One has something worth while to exhibit at the show on its own account and not to win a prize over a competitor.

Of course all this implies considerable study, but this is a requisite to good gardening and to satisfaction. It also implies doing real manual work yourself; this surely is also essential to any real joy in gardening. With increasing specialization in all kinds of endeavor we are in danger of lessening the range of our usefulness, and I fear that we are also missing some of the primary satisfactions of life. These satisfactions are the ability and the willingness to do things with our own hands. It is a great resource to be able to turn one's hand to a variety of work, with tools and tillage implements, and machines, to be able to repair, to paint, to improve, without calling on some artisan or semi-professional for aid; such capability means mental agility, and it puts one into contact with many diverse experiences and fills hours that

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otherwise might be merely empty and idle. All these remarks apply to horticulture as well as to anything else. We like the idea of a person sowing his own seeds, transplanting the seedlings, setting out his or her own rose-bush or lilac, handling the pruning-shears, picking the bugs, as well as gathering the flowers. It is all an essential part of the garden year, and it is the way one learns the plants themselves,—learns them so well that one may then go to a book for additional information. Do you know how to sow seeds deftly? to make cuttings? to put down layers? to bud and graft? to prune? to provide proper winter protection?



I have been speaking of the needful diversity in plant material. I do not refer merely to new horticultural varieties of standard species or groups, as of strawberries, tomatoes, peonies, roses, dahlias, irises, or to “novelties,” but to species themselves; it is in diversity of species that the greatest variety lies, as well also as the keenest interest in discrimination, propagation, cultivation and experiment. It is a striking defect in our present teaching that we do not train the eye and the mind to critical identification of the kinds of plants, whether cultivated or wild; we thereby deprive the learner of one of the great resources not only in gardening but in the joyful art of living. Accurate identifica-

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tion of objects, of whatever kind, is a primary educational process, but we fear it is sadly neglected.

While diversity is increasing in hardy and open-garden material, it is otherwise in greenhouse subjects, and in this field probably we face a real and deplorable loss. I am informed by the greenhouse builders that private houses are increasing in number, but they are used mostly as service-adjuncts for the growing of cut-flowers and bedding-plants, and of pot-plants for the residence rather than as an integer of a home or estate or an extension of the residence in which real greenhouse and hothouse plants are reared for their own interest. These old hothouse plants are all undoubtedly in existence somewhere in the country, one here and another there, in private places or perhaps in the odd corners of old ranges, and there are still a few commercial establishments that handle more or less of them; but one does not now expect to see the private palm house or the old collections of begonias, selaginellas, ferns, nepenthes, bromeliads, heaths, dracænas, dieffenbachias, anthuriums and alocasias, and general "foliage plants." The palms illustrate the case well; they are now grown more extensively than ever before for effective decoration, as in hotels and halls but in few species; they are scarcely hothouse or greenhouse subjects in the former sense. The price of labor, coal and general sup-

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lies, the dearth of apprenticed gardeners trained in different departments of gardening, and the growing habit of running away in the winter, make the hothouse difficult; the War made heavy inroads; yet there is no phase of gardening fraught with such peculiar possibilities and none that more exactly displays the love of plants. We need here a real revival. Great numbers of new plants would soon be available to meet a renewed interest in this noble branch of horticulture.

* * *

To the true horticulturist and gardener, the plant is a persisting delight at any time of the year and not alone when in its fullest ornament. The lilac bush has a lilac character in winter as well as in spring. The barberry is a barberry at any season. The pinks are characteristic in their evergreen tufts even in the snows of midwinter. Shrubs have their yearly characteristics. The first growths of spring are fascinating; the mature leafage of midsummer is satisfying; the leaf-fall of autumn is the crown of the year; the bare structures of winter are dignified and reassuring. To see the plant respond is the reward of the gardener. He likes to propagate it for the mere joy of the effort, for the expectation of the result.

Some of the present tendencies in gardening may be social and imitative phenomena. In

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one epoch it may be the water-garden, color-garden, perfume-garden, rock-garden, or winter-garden. This is all well and to the good if back of it lies the real feeling of the gardener. To develop this background demands a kind of instruction and training in which we are not yet proficient.

Any enterprise closely associated with homes and that hopefully employs the leisure of multitudes of people is worthy of investigations and researches conducted at public expense. It is a sad attitude of legislators and others that predicates the need of such investigations on the probable money earnings of the enterprises, as if there were no other measure of human life.

Great numbers of people cannot have real homes; to these any contact with plants is worth while and to be encouraged, even though not a single plant can be well grown on their premises. But even to these unfortunates there remains the priceless privilege of a clear knowledge of the identification marks that distinguish the considerable array of plants they are likely to meet in the day's experience; for a nature-study aptitude is a fertile contribution to gardening.

Before me is a statement in manuscript that was written many years ago, entitled "To one who hath no garden." Probably it has been published but I have forgotten and so, undoubtedly, has everyone else. It so well expresses

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the sentiment briefly introduced in the preceding paragraph that it is added here although it is an afterthought. It comprises the next half dozen paragraphs.

There are two parts to gardening,—the growing of the plants in the soil, and the garden in the mind. The desire to have a garden comes first; then comes the season of planning, the pleasant discussion of the kinds, the tools, the construction of hotbed and frame, and the layout worked over and over again until the area, the desired products, and the purse are all accommodated and made to fit; finally comes the putting of the plan into execution.

I know persons who are musicians and yet have no musical instruments. Some of them can perform on instruments and some of them cannot. If they are performers, they miss the instruments the more. Do not most of us, with high taste for music, secure our satisfactions in it from those more fortunate or more skillful than we?

I know poets who do not write poetry, artists who do not paint, architects who do not build. I know gardeners who do not garden.

It is not for me to depreciate the joy and value of a garden that one makes in the good earth with one's own hand; yet the garden is an appreciation. It is an appreciation of activity, of color, of form, of ground smells, of wind and rain and sun, of the day and the night, of the

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things that grow. Good critics of gardens, good lovers of gardens, may yet not be good gardeners; and good growers may not be deep appreciators of gardens.

To one who has no garden (my sympathy is his!) there still remains some of the essential joys of the garden,—the wonders of the catalogues, the invitation of the soil, the discriminating knowledge of the plants. A garden is only a piece of the world,—a piece that one picks out and arranges for one's own exercise and pride. Beyond it lies all the world's garden. Beyond it are other's gardens, also the open greensward of fields, the wonderful trees, the flowers at one's feet, the voices of birds, and the abounding atmosphere. One may sit at another's garden gate, and feel its beauty; one may wander afield in any afternoon or holiday; one may be open to the suggestion of garden and beauty as one travels back and forth, missing nothing.

We wish that every person might have a garden. We wish also that every person might have an instrument of music or good books of verse. Yet the year is not lost without them. And if one has not a garden then must one make the most of the compensations, never foregoing the satisfactions in the gardens that others make, in the gardens kept by the public for such as they. This is only to say that we would have the garden sentiment possessed of all the

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people, missing not one; some of the people will grow their own gardens also.

* * *

Who is a horticulturist? Perhaps no one can say; yet there are a few unfailing marks of him, lying in the long history and tradition of the subject: The true horticulturist or gardener has an abiding love of plants, keen appreciation of the sentiments associated with them, reasonable skill in growing them, a feeling for the many kinds. It does not follow that the horticulturist now devotes himself to the actual growing of plants. Practices have changed greatly in recent time, labors have been divided, the scientific and educational phases have assumed great prominence. The above qualifications more or less condition the approach to the subject; one then adds the special preparation and intention required for particular lines of effort. These qualifications are of the heart as well as the head.

These qualities admit him or her to the fellowship. Whatever other knowledge and qualities he may possess are in addition thereto and set him apart, in their varying degrees, among his fellows. The horticulturist knows, in general, what is meant by a genus, and should not use the class-words *species* and *variety* interchangeably and has a conception of the significance of synonyms; this comprehension is

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necessary even to a superficial understanding of the kinds of plants and also to an appreciation of the vexed subject of botanical nomenclature which, unfortunately, is often discussed only on the basis of personal opinion. Because a person has learned a certain set of names and his convenience would be disturbed by any change in them, it does not follow that the names are sacrosanct. All this is the result of considerable study and also diligent application. No one ever becomes a horticulturist by dreaming about it, by paying dues, by diligence at meetings and shows, and by purchasing plants at the store.

Having these qualifications, a person may be in addition a fruit-grower, nurseryman, florist, plant propagator, vegetable-gardener; without these qualifications he may be any one or all of these craftsmen or vocationists and not be a horticulturist; he may be teacher or investigator. We lay out our designs with much consciousness of art and plant the place with skill, we are successful in commerce, but it is not horticulture until it becomes part of a man or a woman.

The foremost interest of the horticulturist is in plants as distinguished from plant materials. To him or her a plant means more than a bouquet or a decoration, a table-piece or a floral design. He wants to know its name, where it came from, how to propagate and grow it. He

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wants a picture of a plant in his magazine, and if a novelty so much the better, with accurate information about it. Witness, in this regard, the journals in England, where the amateur interest is mature. He admires his plants alone when nobody is looking, and loves to be with them for companionship in all odd hours, in the propagating-frame, in the open garden, in the greenhouse. When not in bloom they are his, at morning, noon and night. With discernment and discrimination he talks about them now and then with sympathetic friends. To him a garden is a place where plants grow

2. *Blossoms*

In January, 1912, a magazine called "Flowers" was set forth in New York. It was short-lived and I do not know when or why it came to its end. Recently the first page of the first issue was found among my papers, comprising "a foreword" by myself entitled "Blossoms." In part because the statements are in harmony and in part because a record may be made here of the magazine (and also in part because the essay has the merit of brevity), the article is reprinted here.

There are two parts to the common day,—the performance of the day, and the background of the day. Many of us are so submerged in the work we do and in the pride of life that the real day slips by unnoted and unknown. But there are some who part the hours now and then and let the background show through. There are others who keep the sentiments alive as an undertone and who hang all the hours of work on a golden cord, connecting everything and losing none; theirs is the full life; their backgrounds are never forgotten; and the backgrounds are the realities.

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The joy of flowers is of the backgrounds. It lies deeper even than the colors, the fair fragrances, and the graces of shape. It is the joy of things growing because they must, of the essence of winds woven into a thousand forms, of a prophetic earth, and of wonderful delicateness in part and substance. The appeal is the deeper because we cannot analyze it, nor measure it by money, nor contain it in anything that we make with our hands. It is too fragile for analysis.

This fragile intimate brotherhood with the earth must always have been a powerful bond with men and an infinite resource to them, although we catch little of the feeling of it in the ancient literatures. Men must always have responded to the wild rose and to the tenderness of the grass. Certainly we know that men very early began to assemble blossoms about their homes, and to pass on the seeds from friend to friend.

Centuries ago great elaborate books were written about flowers, and the kinds even then were many and some of the forms were marvelous. Worship and praise have centered about flowers and garlands rather than about the fruits that we eat; this marks them to have been considered as of the higher things. All holy and great occasions need them if the occasions are complete. Not a soul but responds to blossoms, even though he knows it not. No

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soul passes a lily in blow, an apple orchard in the May, a clover field swept with red, or a good garden, but that some reflection of it enters his mind and lodges itself in some nexus of the brain. It would be difficult for any man to imagine a flowerless world; and if he conjured it in his dream he would find himself sitting in some oasis of greenery and bloom.

There is much speculation as to why flowers ever came into the world or what necessary utility they are to plants. But we are free to accept a fact; and flowers are facts. I think there must be something more than mere utility to the plant that brought blossoms into existence. But why ever they came, they are joyful things and they are parts in the journey in life. To know a flower well and to grow it well are more than botany and gardening. The songs of birds, the feel of winds, the flow of streams, the appeal of flowers, are so real that we are likely to forget them or to lose them; but the flowers excel them all in the ease and completeness with which we may adapt them to personal needs and incorporate them into a process of life.

3. *The Friends*

We cling to old kinds of things because associations are in them; yet the unusual and the recent have special attraction and they provide new experiences. There is adventure in the novelties, even if no more than to try plants of the woods and fields in new places. Years ago I wrote of my "weed garden," a narrow border back of the residence into which were placed living roots of anything gathered in the forays and at any time of the year. In this day it would scandalize the garden artist, but could not avoid the feeling that the effort was quite worth the while; at all events it was unconventional and therefore mine.

It is indeed strange how laboriously we hold fast to the old kinds. This is evidenced in the current subject of plant-breeding, whereby we try to satisfy the desire for novelty by endeavoring to "improve" the old species; thus we ever have new snapdragons, larkspurs, pansies and others. But broader variety and much new interest may be had out-of-hand by growing a greater number of species rather than by endeavoring still further to modify the old ones

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into small and unimportant variations. Our major desires in plants are really very limited, and we are not yet in sight of a real appreciation of the vegetable world. In some of the staple ornamentals we are introducing wholly new elements in the form of species recently advanced to cultivation, as in the roses, but in great part we are threshing old straw.

We are wont to think that our so-called new creations in garden plants are wholly novel, that their like has not been seen before, as if we at last are the master craftsmen. Here let me open the ponderous "*Hortus Eystettensis*" published in 1613, describing the plants in the Eystadt garden in Bavaria, seat of a German prince-archbishop (the modern Eichstädt), choosing the rare luxurious edition with hand-colored plates. It is so big that it is a good load to lift. This great work is ascribed to Basil Besler (1561-1629) apothecary in Nuremburg. It abounds in copper plates showing the plants in natural size. We shall be astonished at the wealth of ornamental and other plants, and specially by the great double blooms of many kinds, apparently as good and choice as those of the present day. It would be interesting, also, to note the present-day species that Besler did not know; but for the moment let us admire, as we turn the pages, such plants as the double-flowered pomegranate or balaustia, good apricots, foxgloves like ours, great snap-

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dragons, full-double stocks and aquilegias and larkspurs, many excellent lilies and irises, enormous sunflowers, calendulas double and profliferous, excellent double hollyhocks, showy candytufts, castor bean, clematis, crocuses and similar things, good double forms of lychnis and scabiosa, resurrection plant, lilacs, double-flowered cherry, double-flowering quince, snowball, currants, great poppies double and single like those of the present day and also big double marigolds and carnations, tomatoes, eggplants, peppers in variety, tobacco, sorghum, Papas Peruanorum or potato, artichoke, indian fig, strawberries, big edible asparagus, double buttercups and violets and hepaticas and narcissus, many tulips some of them double, completely double roses of many kinds and heavy double peonies, daisies also full double, and very many more.

From Besler one may go to the wild, into the evergreen garden of nature in forest and swamp and by every shore. Here also may be associations and good companionship, and here one may feel that one is near the backgrounds from which all the garden kinds have come through the obscure processes of the centuries, for our cultivated plants go farther back than we are wont to think. Man was early a cultivator of plants. There may have been commerce with the western world before the days of Columbus. We need now a keen fresh study of

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these origins in all lines of domesticated plants, and not alone from the historical and literary side, as in the fertile investigations of DeCandolle on the sources of the main food plants, but from the biological point of view as well; for Vavilov is undoubtedly correct in his thesis that some of the "species" of cultivation we habitually accept as homogens are really assemblages of races that may have had different origins and have arisen independently in unlike geographical areas. The investigation of the origin, nature, and course of development of the anciently cultivated plants is a refreshing field that we have yet scarcely entered; our accepted information needs to be largely recast.

If one knows plants or animals in the wild in their varied and attractive habitats, one also develops a regard for the objects as they are, without trying to make them something else. And, similarly, if a person distinguishes species in the garden he likes to remember their distinctive marks and be able to recognize them over and over again. It is therefore not without misgiving that one observes the growing tendency to hybridize everything at sight. We are engaging in the obfuscating art of mixing things up. This may be well enough in the old horticultural races in which original lines have long been blended, but even there the work is likely to be without discrimination or good reason; but to begin forthwith to hybridize

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species recently introduced or of which proper records are not yet made or that have not left their own impress on the soul, is a very doubtful proceeding, or one that should at least be undertaken only by competent plant-breeders after careful consideration and with critical study and full registry. We deplore the confusions in the origins of cultivated plants, and yet we would begin new anarchies for the embarrassment of our successors. Much of the desire to cross everything expresses a lack of sensitiveness to the creation and want of appreciation; it is part of the prevailing lack of clearness in identification; and I am not sure but that there is something of a moral issue involved in it. If we are keepers of the earth, it is certainly part of our obligation to let many things alone, in the lines of their natural development.

* * *

More than three hundred silent years have come and gone since Besler knew the wonderful garden in Bavaria. Vast changes have overtaken the affairs of men since then, but his plants are in the gardens still. We add our friendships unto his.

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The plat on which the three hundred and seven kinds of plants were grown this year measures about twenty by forty feet. It is an ordinary piece of land such as one finds in the rear of a residence, partly made by filling, and put into condition year after year by timely tillage, abundant humus and more or less chemical fertilizer. As the plat is in no way unusual, neither were the plants unusual except as to their kinds.

At the outset the reader wants to know why any one in his senses would want to grow so many kinds of plants. Presumably the tendency is to cut down the number of kinds; if so, then I assume that folks wish to reduce their chances of enjoyment. Be that as it may, the three hundred and seven were planted on this little patch because there was no other place to grow them. The remainder of the garden was taken by a still greater number of kinds; and seeds and roots accumulate rapidly if one so desires.

The larger part of the three hundred and seven were distinct species of plants. Only a

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small number represented horticultural varieties, and even these were mostly under Latin names as if they were species. There were no florist's plants among them, none that would now attract a window customer. Of course, not all the number found perfect conditions on the little plat and perhaps some of them did not produce their best; this was not to be expected; but they were not grown for display or to develop the most perfect specimen plants; nor was anyone invited to see the garden, for it was not of the usual kind and not in competition and perhaps the visitor would not think it a garden at all. Yet I felt it the best annual garden I ever made. To make amends the area will go into a plain flower-garden next year, with colors to fill the eye. Last year it was a vegetable-garden.

Why did I grow them? Because I wanted to find out what they were, and there was no other way; and if there had been any other way I should have grown them just the same, not caring to miss such a good opportunity. These plants were offered by seedsmen and others; it is good to know what plants are in cultivation. My reader, wishing a reason, may call it a specimen-garden.

* * *

No, the plants were not much crowded, at least not for my purpose. There were twelve

rows running lengthwise the plat. The reader can calculate the distances, and the length of row given to each kind; I have neither the time or inclination. I put them all in myself, on my knees; this develops the proper mental attitude. The little row or drill is made along a garden-line with the point of a triangular hoe. All the seeds in a row are sown at one operation, in the bottom of the open drill, choosing for each row plants of similar size if other circumstances allow. Stake-labels have previously been written, and these are securely placed before the seeds are dropped. Then the seeds in the entire row are covered by sifted well-rotted mold obtained from my perpetual compost of leaves and litter, with no soil on top; then the mold is pressed down by the blade of a stout hoe, my foot on the blade.

How they grew! Sown the first week in May they came up in legions, for I always sow thickly to insure a stand, to allow for weak seeds, and to obtain the pushing effect of a lot of sturdy shoots; one can afford this liberal seeding in two feet or less of row. The thinning was begun almost as soon as the plants appeared, for one cannot correct the injury of overcrowding in these tender things. With a flat label or a small hand-weeder, and with fingers, great numbers of the plants are removed at once. Before any injury was wrought, the plants were thinned again, and perhaps yet

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again and again. About two or three good plants of each kind were wanted; but to allow for accidents, four or five or more plants matured. Some of them are staked if need be. Neighboring plants are restrained. The rows are gone over every day or two. Every first bloom is seen.

What "effect" was obtained from this garden? the reader is asking. None. I was not working for effect, not even for bloom in the usual sense, but for plants. Of course the result lies in the record; and the record is a good specimen (perhaps several specimens) on an herbarium sheet, with the dates, the color, and any other note not shown by the specimen itself; and the seed-packet is with the specimen: the reader may learn more about this form of recreation if he has the patience to read the article called "Candytuft." Somewhere there should be a record of the things in cultivation. It will be needed some time.

No, this form of gardening is not recommended to anyone. It is reserved specially for my own delight, and I have been addicted to it for so many years that I cannot forego it now as the day approaches the twilight. The plants in my garden and in all wild free places have been my companions. How many are the thousands and the thousands that have complimented me by growing in my garden, and what memories they release!

Choice associations these plants bring to me. Amongst the three hundred and seven were twenty-six kinds of lupines: species yellow, purple and violet, blue, white, big-seeded and little-seeded, smooth and hairy, short and small and tall and big, native in Mexico and Guatemala, southern Europe, California, South America, Oregon, Texas, and otherwheres, all growing side by side where not one of them is naturally at home. Is it not wonderful?

Surely I should be thankful to collectors and seedsmen who have assembled these treasures and have made it possible for me to have them almost without effort in my little garden, all by myself. Here following each other in a row are two species of *Collinsia* (commemorating Zaccheus Collins, an early leader in Philadelphia) from California, the odd fleshy compositous *Cryptostemma* from South Africa and Australia, delicate *Diascia* from South Africa, *Dimorphothecas* waiting for the sun, an *Elsholtzia* from Asia (not to be confounded with the very different *Eschscholzas* of California), brilliant *Eutocas* from California that may be named in *Phacelia* if you prefer, several pleasing *Gilias* from the West, little western *Leptosiphons* that may be placed in *Gilia* or *Linanthes*, *Grahamia aromatica* "in pastures and shrubby hills" of Chile and now placed with the *Heleniums*, the pleasant *Helipterum corymbiflorum* of Australia, *Lasthenia* from Cali-

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fornia, indefinite *Leuceria senecioides* of Chile, button-headed Lonas (or Athanasia) of the Mediterranean country, brilliant Tagetes from Mexico, a dainty red-flowered little Spargularia not yet made out, and others. What a goodly internationalism is this! And what is the magic that enables all these diverse things from around the wide world to thrive in the one soil in my obscure garden? The world is surely a vast and pleasant democracy.

* * *

The reader will note that some of these plants have two or three names and this may affright those people who demand an invariable nomenclature. Botanical nomenclature is part of a living technical language that has been evolving for hundreds of years. It can never be made invariable, nor ought it to be petrified into rigidity.

Some of the best history of plants is suggested in the Latin names; and there may never be agreement as to whether *Eutoca* should be referred to *Phacelia*, whether *Grahamia* as a genus is really distinct from *Helenium*, for there is no finality in natural objects and no more possibility of agreement among botanists than among politicians, churchmen, grammarians, economists, horticulturists, or others on the subjects with which they deal, and, moreover, the naming of plants follows recog-

nized rules of procedure in scientific work; in the natural history of the case, stability in names is unattainable. The different interpretations are of real value in the record; and the more synonyms a plant has the greater is the interest in it, because the many names suggest perhaps wide distribution or great variability or a long devious history in the books, or knowledge of it on the part of many persons. Most of the synonyms are not mere dead names, as so many persons suppose; to the practiced eye they open at once a suggestive field of interest and investigation. To know the plant, one must know something of its history.

It is said that a uniform and constant set of names is needed for purposes of trade. If so, let a competent body of delegates, representing "the trade," adopt an arbitrary list to be used in commercial catalogues for a given series of years; and let the list be revised at the conclusion of the periods, to keep in touch with the important necessary changes. But such an arbitrary list can never constitute a code of nomenclature or take the place of rules to determine cases, nor can it be adopted by working botanists except insofar as it happens to conform to essential botanical practice. Nomenclature must be natural and controlled by law, never despotic. It must be at least as variable as are the plants. Some of the present botanical disagreement is of course unfortunate, and con-

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tinued effort should be made to unify the practice; but if horticulturists had a better understanding of the principles and precedents underlying the naming of plants, the subject of nomenclature would have few terrors, as has been suggested in an earlier page. The more exact one's knowledge of plants the less perplexing is the nomenclature. Perhaps a thousand names have been applied to my three hundred and seven, but they do not detract from the ease, precision and joy of growing and knowing the plants.

* * *

Among the three hundred and seven are some fifty kinds of grasses. They are a fascinating lot. They bear no resemblance to the twenty-four kinds of *œnotheras* alongside, although sown the same time in the same soil and tilled by the same tools in the same hands. I do not know why, except that grasses are grasses and *œnotheras* (or evening-primroses) are *œnotheras*; but this is not an explanation. Among themselves these grasses are various enough for any taste, from the hair-like tufts of fescue three or four inches high to the rigid straight culms of a *Pennisetum* at the end of the row nine to ten feet tall. Both these plants grew in the same number of days. There are dangling *Brizas*, lawn-like *Poas*, capillary *Panicums*, and the heavy stalks of *Caragua*

corn. Many choice ornamental things are among these grasses, fit for mass-planting, edgings and bouquets. Yet in our day the grasses will not be much sought as ornamental subjects because not sufficiently showy. They do not advertize or obtrude themselves and would not consort well with the gaud and emphasis necessary to make such things popular. The fact that so few persons choose the modest plant-forms should make these forms the more attractive to such as desire a more personal expression, or who are interested in minor effects.

It is not profitable to enumerate more of the kinds, although I can hardly refrain from mentioning the mats of *Herniaria*, the excellent *Amellus annuus*, good first-year *Campanulas*, graceful *Baeria gracilis*, *Ambrosia mexicana* (which is the persistence of an old herbalist designation for the Jerusalem-oak or *Chenopodium Botrys*), renascent *Anastatica*, bright *Nemophilas*, a good lot of *Nemesias* and *Linarias*, *Viola bosniaca*, *Abronia*, *Anoda*, aromatic *Gardoquia* or *Cedronella*, white *Ismelias*, *Anacyclus*, *Spilanthus*, blue *Nolana*, stalwart *Pychnostachys*, ephemeral *Commelina*, and showy *Calandrinia*. Some of these names may seem strange to the American gardener, but they are as interesting for all that.

With this fragmentary enumeration some of my readers will more than ever ask what is the

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use of it all. Such a miscellaneous lot will by them be cast into the discard of "novelties," which is the sufficient and final condemnation. It is the commercial men who most object to a large number of varieties, and for their purposes they are right. The canners properly reduce their varieties of corn and beans and peas to the very few that meet their needs; the commercial orchardists cannot afford a miscellaneous variety of peaches, apples or grapes; the florist knows only a few profitable roses for the cut-flower trade. I am in complete sympathy with the reduction and standardizing of these varieties for trade purposes. But this is no reason why the commercial men should propose the elimination of variety for other people,—that would be an impertinence.

Let not my reader think that all the three hundred and seven were worth the effort beyond the study and record. A good number of them were little better than weeds with me. I do not wish to condemn them outright, for they may be attractive in other climates or locations, although some of them have been grown several times; so the names are not mentioned. Some time ago I wrote, "I am convinced that some of these old garden species are not now worth growing for any horticultural ends." I have long wanted to publish the species traditionally grown for ornament or interest that should now be eliminated from cultivation and the names

taken from the lists. Many new kinds have come into cultivation of much better quality and promise. We admire the sentiment attached to old kinds of things, but some garden plants have lost the charm of association and are no longer worth while. Progress is made by eliminating species that have lost their appeal as well as by adding new ones. And yet we must be cautious in making judgments, for plants that are indifferent with me may be excellent elsewhere. I have never had satisfaction with *Linaria maroccana*, for example, but recently saw it in rare perfection in spring in Southern California, grown in a great mass as a winter annual.

Considering all this interesting lot, assembled from the ends and corners of the earth, one wonders at the conservatism of the gardener; for the gardener desires the plants he or she has known before, perhaps those that were in the garden in the old home. So year after year we grow larkspurs and petunias, sweet peas, gladiolus, verbenas, calendulas, poppies, asters, candytufts, zinnias and marigolds, and a few others, content with the regularity, perhaps even the monotony. It is well to break away completely now and then, and take a season with new acquaintances.

It is not necessary for Americans to search for 307 kinds of plants in other lands. North America abounds in species good for planting

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of which no real or adequate use has yet been made. Laboriously we import plants from remote countries when our own woods and plains may bear kinds in every way as interesting and useful and much more in keeping with our situations; this is not because familiarity breeds contempt but because we are neither botanists or horticulturists and therefore do not know our own resources. Schools disdain the study of the kinds of things, under the unnecessary prejudice that "systematic botany" is of no account, and instead may teach a kind of botany that has practically no significance to the pupil nor any superior training value. The generations are growing up in inexcusable ignorance of nature. Good appreciation and knowledge of horticulture must begin way back in the younger years and with the preliminary training.

* * *

The 307 of my garden-patch are gone. We knew them well, and enjoyed the acquaintance. We shall never see them assembled again; but if worthy of them we shall profit by the memory of them in the remaining days.

5. *Candytuft*

In the first article in this book it is said that study and application are required for the making of a real gardener. Let us see what type of study may be necessary if we are to acquire a critical satisfaction about the kinds of plants.

The candytufts are a puzzling lot to the beginner who is interested in identities. They are much alike, particularly the annual flower-garden kinds without great difference in statures, habit, season and color; yet one is conscious of dissimilarities that seem to baffle discovery. Even as early as 1752, before Linnæus had introduced order into plant nomenclature, Philip Miller, author of the first great gardener's dictionary, said that the annual candytufts were confused and that the seed of one species was sold for a variety of the other although "it is evidently different." For many years I grew candytufts in the common casual way, always with enjoyment and yet with that lack of intimacy that is the result of unacquaintance with the kinds.

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One does not discern the differences between plants merely by growing them side by side. The gross characters become apparent at once, but real diversities are more than height or shape or color or fragrance or size. Few amateur gardeners distinguish closely or are sure of the essential marks, even though they know the plants by name; and yet the ability to identify, whether plants or animals or minerals or stars, is perhaps the first requisite in good education. It is the product of accurate observation. The ability to discriminate objects should also aid powerfully in the identification of ideas.

The difficulty arises from the fact that a living plant is not a record. It soon dies and is only a memory. A photograph may record its general features but it is only an imperfect image; and we do not yet know how permanent photographs may be. Drawings and paintings carry the interpretation of the artist and they cannot record all the significant details. Descriptions, ever so painstaking and particular, do not produce a composite mental picture. The usual gardener's or horticultural notes recall the events in the cultivation of the plant but little of the plant itself. Living plants, photographs, drawings, paintings, botanical descriptions, horticultural notes and any extent of tabulation of seasons and heights

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and colors, literary accounts of divers kinds—all these together do not constitute a complete record, and even with such supposedly perfect data we cannot understand any group of plants or be able to diagnose the different species clearly.

Writing on this theme four or five years ago in a technical paper on the cultivated blackberries, it was said: "Perplexing as are the difficulties now, they will be vastly greater in years to come unless the steps are recorded in good herbarium specimens and careful diagnoses. Horticultural records are not sufficient: the plants themselves must be permanently represented in preserved material; the usual horticultural notes may miss some of the important characters, and they are likely to lead to opinions rather than to evidence. If good specimens had been made of the early varieties and departures, we should not now be guessing about origins."

Memories of plants are sufficient for sentiment and for the practical purposes of cultivation, but if one would really severelize the kinds and know them positively rather than dubiously, one must have records that remain indefinitely, that are assembled year by year and that may be used for close comparison at any time in winter or spring, in rainy days or snows as well as in the glow of summer, at times

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when there is leisure to go into the comparison with pains and devotion.

* * *

Long ago I became interested in the confusion in the kinds of candytuft. The names on the seed-packets did not seem to represent definite species or classes and the available illustrations did not identify. In a group of many kinds of any plant, a person cannot identify one at a time; several or all the kinds should be in hand at the same moment, when they will not wilt or shrivel or blow away; for identification is the result of close comparison.

For a number of years botanical specimens were made of candytufts, as of other plants, drying them under pressure and then "mounting" or fastening them on the large sheets of stiff white paper that botanists use in the herbarium. These are records of candytufts, made from plants of my own growing and from the gardens of others, and assembled from collectors who have taken them in the wild in their native places. Here they are today, about one-hundred sheets of them, of many kinds and regions, spread out on my table with the snow high in the bushes outside my window; and underneath the snow only a few feet away there is a thick sturdy clump of one of the evergreen perennial candytufts that will become a vivid green in early spring and will dazzle itself with snow-

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white flowers in the later days of May. Here one may study the records at ease; and then go back to them for verification or for new study, as one would go back to a book or to an original manuscript.

This *hortus siccus* or "dry garden" may seem indeed like a poor and uninteresting thing to the gardener, who associates his experience only with living growing plants. But all the characters of difference are present save perhaps color and fragrance and some minor features, but these losses are made good by notes on the labels or in the head, for we know them growing as well as dead. The absence of the color and odor and other attributes that produce a sense-sensation is itself of value here, for now the attention is concentrated on the permanent and perhaps more significant distinctions; some of these differences, little seen by the gardener, may indicate relationships and may also mean much in the long developments of the plants in ages past. Here are shown the habit and framework of the plant, and whether glabrous or hairy or pubescent; position, shape, substance and indentation of the leaves; character of the inflorescence; structure of the flower, even to all the stamens and the pistils and the compartments with the ovules that ripen into seeds; the fruit itself, and the seed in its due season. It is from such specimens that most botanical descriptions are drawn, and without

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them the plants of the world would not be known. A man may travel far in strange countries, collecting plants, but may not know what he has or whether any one of them is new to science until the collections are brought home and assembled in study.

* * *

The definite history of the candytufts begins with Linnæus, who in 1753 first systematized the nomenclature of plants and subsequently of animals. For the genus or group he adopted the name *Iberis*, an adaptation of the old *Iberia* or the peninsula comprising the modern Spain and Portugal, where some of them are native. The name *Iberis* had been earlier applied to these plants by the herbalists, as well as the name *Thlaspi* which now designates a different genus of the same family; but *Thlaspi* is still used for the candytufts in French writings and catalogues. There are thirty or forty species of *Iberis* in the region from Europe to Western Asia, only a few of which are known as cultivated plants. *Iberis* is one of the Mustard family, as the flowers and the pods well testify, although we might little suspect that it has close relationship with cabbages, radishes and stocks.

Linnæus at first recognized nine species of *Iberis*, two of which are now placed in other genera. He knew the four common ones now

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cultivated, *Iberis sempervirens*, *I. gibraltarica*, *I. umbellata*, *I. amara*. It was not the necessity in those days to contrast species to any extent, but it is interesting to note that Linnæus says of *I. umbellata* that the fruit-cluster remains hemispherical in shape, "Fructus hujus corymbosus hemisphæricus persistit"; this is a suggestion of a clear separation from *I. amara*, in which the cluster elongates in fruit until it is several times longer than broad. For our garden purposes, however, we may separate the candytufts into two cultural classes, the annual wholly herbaceous kinds, and the half shrubby evergreen perennial kinds. The four usual species then take the following brief characters of separation, all of which show well on the herbarium sheet; and the gardener may do well to try to distinguish them closely as a proper exercise in identification.

1. Candytufts of the annual kind, of short duration and grown every year from seeds as flower-garden subjects.
 - 1a. Clusters not elongating: leaves long-pointed, usually entire: flowers colored, not fragrant. GLOBE CANDYTUFT
 - 1b. Clusters lengthening as the flowers open and becoming much elongated in fruit: leaves obtuse at the end, prominently toothed: flowers white, fragrant. ROCKET CANDYTUFT
2. Candytufts of the perennial evergreen kind: plants woody at the base, 1 foot or less high,

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with branches persisting the winter (as far as hardy).

- 2a. Clusters remaining about as broad as long, or even broader: leaves broadening toward the end, often somewhat toothed: flowers lilac or purple-tinged or soon becoming so. GIBRALTAR CANDYTUFT
- 2b. Clusters elongating in fruit, becoming distinctly longer than broad: leaves very narrow and entire: flowers nearly always white. EDGING CANDYTUFT

The pleasure in gardening is not alone in growing the plants, but also in knowing them. Something of the student attitude is needed for the greatest satisfaction, that the critical and discriminative faculties may be exercised. For this reason it is well to grow several species of a group or several varieties of a species every year in some part of the garden, that careful comparisons may be made of one kind with another.

As further suggestions of features that may profitably be seen, let us look still closer at our four species of candytuft. It is hoped that some of the readers will equally make a serious effort to follow these descriptions, with dead or living plants in hand, as a practice in observation and identification. Two or more of these species of candytuft are readily found in gardens or in florist's shops.

GLOBE CANDYTUFT. *Iberis umbellata*.

Erect branching essentially glabrous annual often decumbent at the base, 1 foot high more or

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less at full growth, the stems with raised longitudinal lines or angles: leaves thin, lanceolate, 2-3½ inches long and often ½ inch broad, tapering at the base into a petiole and above into a long sharp point, entire or bearing one or two obscure teeth or angles on each margin: flowers pink, violet, purple, shades of red, sometimes varying to blush, not scented, in close short head-like umbels that are little broader than long: clusters nearly globular in fruit, the pods ¼-¾ inch long, broadly oblong and with wings at the top produced into points either side the persistent style.

Native in southern continental Europe and Mediterranean islands; it was early known from the island of Candia (now Crete), and from this circumstance arises the English name Candytuft; to the French, however, as we have seen, it is *Thlaspi*, and to the German *Schleifenblume*, indicating that these peoples have traditions differing from ours. As early as 1583 Dodoens, the Dutch herbalist, knew the plant as *Thlaspi Candiae*, that is, the *Thlaspi* of Candia. I have native specimens taken ninety years ago in calcareous soil in mountains near Pisa, Italy, all slender and essentially single-stemmed, one of them 20 inches tall. In cultivation the plant usually branches freely above, becoming bushy. The common garden kinds are about 1 foot high, but dwarf varieties may be only half that

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height. This is the common lilac and purple candytuft of the flower-gardens. If one has good herbarium specimens one knows, when the records are assembled, that here belong such names as Rosea, Lilacea, Lilac Queen, Carmine, Cardinal, Rose Cardinal, Crimson, Lavender, Purple, Atropurpurea, Hybridæ.

The species *Iberis umbellata* is given a colored plate and description as the first entry in Volume 2 of Curtis' Botanical Magazine, London, 1791; the picture represents a rose-purple cluster like those of the present day. At that time, the other common annual species, *Iberis amara* (the Bitter or Rocket candytuft) was apparently not horticulturally recognized; in fact it is recorded as "too trifling a plant indeed to appear in the flower-garden." Yet apparently there was another developed candytuft in gardens, for Miller speaks of it, but it had not been identified with the Amara of the fields. Confusions started early.

ROCKET CANDYTUFT. *Iberis amara* (*I. coronaria* of many writings).

Rather stocky erect usually much-branched plant 1 foot or less high, running into compact and dwarf forms, the stems sparsely pubescent and ridged or angled: leaves thickish and firm in texture, oblanceolate to spatulate, the large ones 3-4 inches in length, long-tapering to a narrow petiole-like base, obtuse at the apex, coarsely and bluntly few-toothed on the mar-

Candytuft

gins above: flowers large, white, fragrant, the clusters at first as broad as long but soon lengthening so that in full flower and fruit they may be 6-8 inches long; sometimes the flowers are tinged purplish on wild or unselected plants: pods nearly circular in outline, with narrow wing that ends in a short nearly blunt point either side the persistent style.

Chalky fields in southern and eastern England, and common in western, central and southern continental Europe, often as a weed in fields, with bitter herbage (whence the name *amara*). This is the common white florists' candytuft used for cutting and grown often in pots; often called Hyacinth-flowered because of the shape and size of the long spikes. One's records should show that here are also to be placed the Empress candytufts, White Spiral, Giant White, Julienne, Hesperidiflora, Little Prince, Dwarf Pigmy. The dwarf varieties are sometimes only 4 inches tall, and bear a mass of bloom. I have collected *Iberis amara* in fields in northern Germany, and once I took it on hills several hundred miles from the coast in China where it had undoubtedly escaped from cultivation. The leaves vary greatly in size and shape.

GIBRALTAR CANDYTUFT. *Iberis gibraltarica*.

Stout wide-spreading nearly or quite glabrous evergreen, the older branches lopping and leafless and sending up vigorous somewhat angled

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leafy shoots 6-12 inches high: leaves 1 inch long, or twice that length in vigorous sterile shoots, $\frac{1}{4}$ - $\frac{3}{8}$ inch broad, oblong-spatulate and therefore usually broader above the middle, blunt at apex, sometimes with a few obscure teeth near the end: flowers lilac to light purple, often opening nearly white and becoming colored, in flattish clusters that become about as long as broad: pods oblong to nearly orbicular, about $\frac{3}{8}$ inches long, the points short.

Spain. Frequent in cultivation and often confused with the Edging candytuft. I have grown it for years; it makes a good ground cover, but is not as floriferous as the other; it seeds very sparingly with me.

EDGING CANDYTUFT. *Iberis sempervirens*.

Perennial spring-flowering evergreen 4-12 inches high, the lower more woody part shedding its leaves after a time, the stems angled, glabrous or puberulent: leaves 1-1 $\frac{1}{2}$ inch long and crowded on sterile shoots and linear or nearly so, less than $\frac{1}{4}$ inch broad, nearly or quite blunt; on flowering stems scattered, $\frac{3}{4}$ inch or less long and usually broader in proportion and blunter, all of the leaves entire: flowers white, in close heads terminating the many erect stems, the clusters separating and lengthening as the fruit appears: pods $\frac{3}{8}$ - $\frac{1}{2}$ inch long, broadly oblong, winged, the points at the apex blunt or only shortly acute.

Native in Southern Europe. It is an excel-

Candytuft

lent plant for low compact neat durable edgings, for which it is much used in parts of Europe. Varieties are known as Little Gem and Snowflake. With me at Ithaca, New York, however, it has not withstood the climate as well as *I. gibraltarica*, although a neater plant of less sprawling character. Sometimes the flowers are lilac-tinged, but it is essentially a white-flowered species.

* * *

All this discussion seems simple and direct enough, but at any moment there may be doubt as to the identity of any one of the varieties of candytuft offered in the trade. Without specimens we are unable to resolve the doubt. Were we studying the garden verbena we should find ourselves hopeless without such records. Project the problem back one hundred and more years to the time when many of our garden plants were beginning to come into cultivation and to assume many forms. We search the old literature in the hope of finding clues to the identity of them, from what stocks they came, the likelihood of hybridity, and all the other questions that arise in the quest of origins; perhaps we construct elaborate hypotheses as to the origin and write essays and books about them, but without actual records that is, without specimens, it is all little better than guesswork; at best we have only circum-

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stantial evidence and clever probabilities. Had we good herbarium specimens of the cultivated forms at the beginnings of the departures we should not now be disputing about the origins of our blackberries, strawberries, dahlias, pansies, larkspurs and any number of other plants; and as for apples, beans, cabbages, mustards, cereal grains, pumpkins, some of the roses and chrysanthemums and numbers more, the origins are hopelessly lost in the darks of antiquity.

The reader must not conclude that the four candytufts described in this account constitute all the species the genus *Iberis* offers to our gardens. Lagasca's candytuft (*I. Lagascana*) is an annual very like *I. amara*, white-flowered, but distinguished by the sharp points of the pods; it is from Spain. In some ways the pinnatifid candytufts are more interesting as flowering plants, with their bright white corollas; they yet remain nearer their original native types than the Globe and the Rocket and are therefore simpler and less arresting; these are in the seed trade under the names *Iberis affinis*, *odorata*, *pinnata*; but interesting puzzles of identity and nomenclature are associated with them which need not be discussed here.

A good number of other kinds are known to horticulture, some of them very like the Edging candytuft. They have been little tested in this country, for our imagination appears not to run

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strongly to such humble plants; and yet the very humility of them ought to be a challenge to us in these days when flares and noises make such powerful appeal.

* * *

Thus far have we spoken of the value of the herbarium record as a means of aiding us in histories and identifications and in developing the needful power of discrimination. All this the reader may attest; but when I say that these dry gardens have beauty and interest in themselves I shall run the risk of losing the reader's sympathy and he may even entertain certain mental reservations as to my lucidity. Yet these good specimens are plants, not images or silhouettes, with their parts all complete and in due order; securely they rest in their places and I go to them again and again to refresh the memory or to live again the times and seasons and circumstances when they were collected. The fair specimens mean the living plant to one; they mean the fields and hills whence they were taken by many patient hands, and often long ago. Many of the sheets have been gone over by experts, who have added their identification of the specimens and their comments, and thus do the associations and the values accumulate as the years pass.

How much these simple labels mean! A laconic simplicity is on them. We know that

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long and hard journeys are behind them, hardships of heat and hunger and fatigue; and who were the persons behind the simple surname or the initials, and why was he impelled to climb the high alps and tramp the dry plains to find these hidden little plants? There must have been an ardent life in these persons else they would not have been collectors, and a tender response to the little quiet voices of the fields. Often I turn sheet after sheet to ponder on the stories in these labels; I know what these brief records may mean, for have I not made them myself in journeys in many lands, in days of doubt and in the lust of strange adventure? When somebody in time to come reads on my label, "Saddleback journey to Araponga," will he know who was lost in the tropic night in strange mountains, will he vision the downpour, the hunger, the abandonment of the train of animals in the forest and the long heavy tramp on slipping trails, the dead fatigue? There are comrades in herbarium labels, rare adventure, high enthusiasm, perhaps tragedy. The herbarium contains the mementoes of my journeys; it is my line-a-day to which to go again and again.

Reverently must we preserve these simple specimens that patient hands have gathered in places we shall never see. Before me are specimens of *Iberis* taken years ago in their native haunts in parts of Europe, with the label script

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in French, Italian, German or Latin as the case may be. With the reader at my side let us look over a few of them. Here is the rare *Iberis aurosica* from Mt. Aurouse itself in the High Alps of southeastern France, collected in 1863 on the 21st of June by Burle frères and Borel. Another is *Iberis Bubani*, marked also with its other name *I. Bernardiana* (connected with which duplication there is an interesting unwritten history), collected in the High Pyrenees of France in 1868, by Bordère, the flowers in June and the fruit in August. One is *Iberis Garrexiana*, much like the Edging candytuft, from the Tenda Alps of north-western Italy, collected by Reuter who wrote extensively on the plants of Geneva. Another sheet is *Iberis intermedia*, collected by Malbranche on the hillocks of Duclair near Rouen, in Seine Inférieure, France. One is *Iberis odorata* from near Athens, Greece, collected in 1876 by the German Pichler. Another set is the scarce *Iberis semperflorens* (very different from *I. sempervirens*) from Palermo, southern Italy, collected by the eminent Italian botanist Todaro, "in fissuris rupium" (in clefts of rocks). Perhaps the choicest of them all is *Iberis saxatilis* from the only station known in Switzerland, the place now being a reservation and persons forbidden to collect the plant; this was collected by Jäggi of the Zurich Botanic Garden in 1869 at an altitude of 1500 meters;

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and I have another collection from the same place by another noted Swiss botanist, Dr. Lager; it is a brilliant plant in bloom, its low masses of white flowers covering the hardest rocks.

It is not alone in reflective sentiment that these labels on herbarium sheets appeal to one. There may be real information on them. Here, for example, are two sheets of "Giant Hyacinth-flowered candytuft"; the label says I grew the plants from Dreer's seeds, No. 1753 of his catalogue; it says that seeds were sown May 16, 1924; plants in bloom, comprising one sheet, were taken July 12; plants in seed, comprising another sheet, were gathered August 23; it says the flowers were white; in an envelope or pocket on one of the sheets is the original seed-packet with some of the seeds still in it: the record is of use if someone would write about the character and the season of this candytuft; by these presents, also, we know it is *Iberis amara*. Other labels before us as these lines are penned say that the plant in question is "Thlaspi odorant" of Vilmorin-Andrieux et Cie., of Paris, no. 79020, *Iberis pinnata*; seeds were sown May 8, 1923; flowering plants were taken July 24, 1923, and fruiting plants August 13; flowers were white; the original packet is in the envelope. Another case is "Thlaspi très nain blanc," *Iberis affinis*, Vilmorin no. 79030; seeds sown May 8; specimens taken, July 30;

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lilac-white; packet in the envelope for verification and to complete the record. Similar records of other plants on thousands of sheets are in the collection.

* * *

In spring and summer candytufts bloom in my own soil; and at all other times I have them still, well housed in my cases. Two gardens, then, are mine, embracing the year.

6. *Pinks*

It is the first day of the year. Two months and more ago the leaves were fallen; the bushes and ground-covers in the woodlands have gradually lost their greens and purples and have become russet-brown. Yet the browns are not today the tones of the landscapes, for the virgin snow has sifted through the forest and settled on the fields. The old accustomed walks into the woods are one with the broad undefined spaces; the trilliums are sleeping somewhere; the birds of summer are in far lands, where I have met them in my journeys in other years. My garden is covered. Only the tops of the tallest labels now mark the places of the roots planted in the heyday of July and of the seedlings that broke the ground early in May and said farewell with the soft snowfall of November.

It is the first day of the buried hopeful year. Through the snow I have waded to my garden of dianthus. Reassuringly the staunch labels stand through the snow, marking the very places of those precious roots I have planted, and on some of them can be read parts of the

Pinks

names. Do the plants know that the names are on the labels, that they may not forget themselves in the long deep sleep of winter?

Over the ground around the plants is placed an inch of soft old mold when the last black-birds left us, and later the stalks from the Golden Bantam corn were laid lengthwise between the rows of pinks; and now the snow has drifted the spaces full and is on guard for me. Yet here and there a blue-green tuft peeps through,—Picotee and Grenadin and Pheasant's Eye from England, perpetual carnations from Germany, and I know that just there are maiden pinks and marguerites from France, alpines from Switzerland, choice things from other European lands, Chinese pinks that bloomed for me in the lost autumn from seeds sown in the open in May and that will flower again when the swallows come, more than two hundred kinds.

How lightly we name the countries whence they came as if they were only idle thoughts! And yet we see the waysides where we have found them growing in those lands, the church with the old bell and the pinks hard by, the stile in the wall, peasants in the walks, green fields and backgrounds of mountains and temples beyond the bounds of Christendom. And how lightly we name the kinds,—those pinks that have been evolved in some loom of mystery through a million years and whose

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destiny to change or to perish or perhaps to exist for a million other years is all unsuspected by us! How worldly quick we are with contacts of men and mountains in a thousand lands that we ourselves have never seen, and how rich with suggestions so faint that we know them not! Under the snow the pinks are still England and France, Switzerland and Germany, far China where we have collected them on wild hillsides, and many places that we do not know. But these pinks are also mine. Some of them will refuse me, for I shall not learn their needs; but by and large they are mine, rooted in my soil, alive to my fingers, and they will not withhold their bloom from me, the blooms that first developed in some far-off place where children speak a strange language, but the pinks speak all languages alike.

Often I shall go to them in the long quiet winter, and shall remember. I shall stand in the snow and know that they are there, snug and secure where they allowed me to place them. And when the creeks begin to run wildly in the spring and the fox-sparrows pause in their passage, I shall remove the stalks, and behold, a magic of blue-green tufts sitting primly in their rows!

The long northern winter holds the memories of the summer months secretively under the snow, and when the snow goes off we feel that we have met old friends of other years that

Pinks

have been on a long journey. It is not so in southern lands, where the winter holds no secrets and uncovers no mysteries. All plants alike survive if they are more than annuals, and there are no memories. But in northern lands there are outstanding differences. Of all the herbaceous humble plants, perhaps the pinks hold their characters best all through the winter days.

Other pinks are in their little pots sunk to the ground-level in the heatless glasshouse, small and tender plants that might have lost themselves in torrential rains and sleeting snows of the open ground. Old moss was sifted over them when the weather closed, they were well watered, and left for the winter. Now they are frozen in. But today I have carried snow to them and covered them, both for protection and naturally to supply the moisture that they still may need.

When the robins are ready, these and all the other pinks will be dressed for the new growth and I shall watch for every bright and spicy flower. Yet I sometimes think that I like the pinks best when they are not in bloom, but when growth is quick and joyous in them and each kind takes its due shape and presents its best dress of different leaf and sheen. In bloom anyone can see them, and even the crudest hastiest visitor will note differences; but when they are not in flower, nobody comes to see and

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they are mine alone. We know them as they are. When the thaws come in January and February we shall see them, every one, and they will have somewhat to say to us. There will be the flat green soft-leaved carpet of *Deltoides* and *Graniticus*, tussocks of *Alpestris* and *Arenarius*, broad low close mats of *Petræus* and the coarser blue-green of *Cæsius*, the deep loose grassy-blue clumps of *Plumarius* that I remember from my mother's garden, coarse sprawly stools of *Caryophyllus*, sods of *Gallicus* and *Connatus*, stiff grassy heads of *Atrorubens*, *Croatius* and *Cruentus*, the big-leaved loose tufts of *Barbatus*, the ragged stands of *Laciniatus* and *Heddewiggii* and others of their sophisticated tribe.

This is my evergreen garden, under the snow.

7. *The Greenhouse in the Snow*

"Who loves a garden loves a greenhouse too," wrote Cowper in "The Task." The greenhouse of a century and a half ago was a very different affair from the glasshouses of the present day both in construction and in the contents, yet then as now it was "warm and snug, while the winds whistle, and the snows descend." It was in this vein that I wrote an article on the greenhouse in the snow many years ago for *Country Life in America* when editor of that new magazine. I had not then read the poet Cowper's meditations on these subjects, else we might have foregone the essay; but as the article expresses experiences that we are likely to lose with the smaller interest in the "unobtrusive greenhouse as an adjunct to a modest home" it is reprinted here.

We fear that the garage is taking the place of the greenhouse, and that the sensation of rapid movement has a stronger appeal than the meditative quiet of handwork in a little glass house. We deplore the passing of this kind of greenhouse with the interesting range of plants and appliances that went with it, and we have

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spoken of the subject in the first essay in this book. One is never in such intimate contact with plants as in a greenhouse. The effort is all concentrated in this little spot. The pots may be shifted at will. Every shoot may be trimmed or trained. Insects are under better control than elsewhere; at all events we can make the climate noxious to them by the various processes of fumigation. Tender plants may be carried over from year to year. Plants strange to the region find congenial home.

When the night has lengthened so that it is dark at supper time, when the leaves are coloring on the fields, when frosts threaten and the summer growths are near their end, there is no satisfaction more keen than to prepare for the protected garden under glass. Summer plants that are still vigorous, as petunias and snapdragon, may be lifted for the greenhouse; late seedlings of calendulas and schizanthus are brought inside; paper-whites, freesias, anemones and tuberous crowfoots are planted in pots or flats for winter and spring bloom, each kind receiving its requisite treatment; carnations are brought in. If the greenhouse garden is a year-round enterprise, attention is now centered in it with new emphasis and all the plants look better in the contrast to the bleakness of the landscape. As the verdure goes down in the garden other greenery extends itself under glass. We begin to feel that

The Greenhouse in the Snow

exclusive sensation of cold climates, the gratification of the housing instinct.

For the practical operations of gardening, an unheated greenhouse is a useful adjunct, and in it one may feel something of the sensation peculiar to a greenhouse proper. A house eight or nine feet wide and eighteen or twenty feet long, made of large hotbed sash, answers the purpose very well, allowing a walk below the peak and a good bench or bed on either side. The season may be lengthened a month at either end, and if a little hand heater is employed many plants can be carried until the hard weather of winter sets in. It is surprising how many plants of divers kinds can be handled in such a house; but it would hardly tempt me to write my sentiments about the greenhouse in the snow.

In the warmer parts of the United States the lathhouse is an effective structure (although not necessarily made of lath), protecting from cold in winter and excessive heat and sun in summer. It is capable of being made an attractive architectural feature of a residence. I think it will occupy an important place in gardening in years to come, even in cold regions for wind and summer as well as winter protection.

The plants of Cowper's greenhouse would hardly be deemed important for the purpose with us, and he mentions few. The "spiry

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myrtle," orange, lime, amomum by which pimenta may have been meant, geranium with "crimson honors," ficoides or mesembryanthemum, are listed. Probably the greenhouse Cowper knew was the early structure in which, as the name indicates, plants were to be kept green through the winter rather than a hot-house or growing-house. The "greenhouse" of our day is a highly developed and effective structure in which climate and environment may be controlled to a nicety and a novel kind of ecology may be established. But we set out to introduce the article of twenty-five years ago, and now it follows only slightly modified.



It is in the dead of winter that the greenhouse is at its best, for then is the contrast of life and death the greatest. Just beyond the living tender leaf—separated only by the slender film of the pane—is the whiteness and silence of the midwinter. You stand under the arching roof and look away into the bare blue depths where only stars hang their cold faint lights. The bald outlines of an overhanging tree are projected against the sky with the sharpness of the figures of cut glass. Branches creak and snap as they move stiffly in the wind. White drifts show against the panes. Icicles glisten from the gutters. Bits of ice are hurled from trees and cornice, and they crinkle and tinkle over the

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frozen snow. In the short sharp days the fences protrude from a waste of drift and ruffle, and the dead fretwork of weed-stems suggests a long-lost summer. There, a finger's breadth away, the temperature is far below zero; here, is the warmth and snugness of a nook of tropic summer.

This is the transcendent merit of a greenhouse,—the sense of mastery over the forces of nature. It is an oasis in one's life as well as in the winter. One has dominion.

But this dominion does not stop with the mere satisfaction of a consciousness of power. These tender things, with all their living processes in root and stem and leaf, are dependent wholly on you for their very existence. One minute of carelessness or neglect and all their loveliness collapses in the blackness of death. How often have we seen the farmer pay a visit to the stable at bedtime to see that the animals are snug and warm for the night, stroking each confiding face as it rises at his approach! And how often have we seen the same affectionate care of the gardener who stroked his plants and tenderly turned and shifted the pots, when the night wind hurled the frost against the panes! It is worth the while to have a place for the affection of things that are not human.

Did my reader ever care for a greenhouse in a northern winter? Has he smelled the warm

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moist earth when the windows are covered with frost? Has he watched the tiny sprout grow and unfold into leaf and flower? Has he thrust a fragment of the luxuriance of August into the very teeth of January? There is no place where the drenching cold rain sounds so good and where one feels so neatly housed from the storm as under a greenhouse roof; it is pleasant to see the streams run down the glass and leap from the eaves.

Greenhouses are of many kinds. There is one kind of the commercial plantsman, and another of the man of means whose conservatory is essential to the architectural completeness of his mansion. Of these we need not speak here, for their necessity is long ago established. But for another kind we wish to plead,—for the quiet unobtrusive greenhouse as an adjunct to a modest home.

The object of this simple winter garden need not be the mere growing of flowers, although these may be had without trouble. It is worth the while to grow a plant just because it is a plant and because we are human beings. The best plant is the one that has the deepest significance to you, even though it never makes a flower. I know a man who has hundreds of plants in expensive greenhouses, and the best plant of all is a little white clover that closes its leaves by night and opens them by day.

Against the background of winter every green

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and growing plant is emphatic. Against the luxuriant background of summer, a plant twice as good may be overlooked and lost. The simplest and easiest things are best, for it is not well to make the uncommon things too common. A dainty rarity is all the better because it is seen in contrast with the homespun of the geranium and begonia; and the common things perpetuate the continuities and purposiveness of our lives.

Like all effort that is worth the while, the labor of growing plants under glass requires watchful care. This care is its own reward. Many plants, however, are easy to grow, and with these the novice should begin; and with them, also, the very busy man should be content. All of us can grow bulbs. We can lift the roots of petunias and alyssum from the garden when the frost comes. We can start the seeds of many annuals in late summer. We can make cuttings of begonias and coleus and a score of common things. Here and there we can pick up something new. Gradually we add to our store; and in three years' time our winter garden, small or large, becomes an unique collection of old-time friends and of new-time rarities.

8. *Rock-Garden*

As we rode, my friend, who had recently returned from Europe, deplored the impossibility of the rock-garden in North America. The climate is too hot and dry; too much artificial watering is required.

I stopped the car, and asked him what he thought of the country. The prospect pleased him. Presently his eye caught a rocky bank, the remains of an old hillside quarry; it was intended that he should catch it.

"What a lovely bank!" he said.

He leisurely took it all in and then I replied, "You said we could not have rock-gardens in this country."

"But these are only weeds and wild bushes," he said.

"Yes, but you pronounced the effect lovely. It seems to be an excellent rock-garden, all the more attractive because of its simplicity and naturalness. Surely there is no fussiness about it."

"Yes, but there are no stones, no boulders, but only a wall of rock."

"So much the better," I replied. "It is nat-

Rock-Garden

ural in its lines and cleavage, the surface is varied, and the weathering is attractive; and certainly you will agree that the structure is harmonious."

I refrained from saying that in some cases one does not know whether the artificial efforts represent a garden or a pile of stones. I have often wondered how certain piles of rocks known as rock-gardens could be kept out of the hands of dealers in building materials; and I have seen other piles from which I wanted to strip the scant vegetation so that we might more easily admire the great variety in the stones. I remember the discomfiture of an old gardening friend who had taken pains to ticket all the plants in his rock-garden when a visitor remarked, "Oh see! he has labelled all the stones."

My companion was interested enough to want a list of the plants that had established themselves on the place. Some of the plants were not in bloom, but the interest was the greater because there was a natural succession. It would have required a season's observation to note all the plants, but here are some of them: to begin with, a good background and side-setting of trees and bushes; then a wild grape-vine on one side, and strands of Virginia creeper and other colorful vines and kinds of drooping things; good background tints of mosses; a number of small grasses in the chinks,

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and two or three interesting sedges; a seat of polypody fern and Virginia saxifrage on a ledge; a few sterile fronds of other ferns; a tuft of bluebells; a colorful piece of coltsfoot; a columbine, herb robert, rosette of geum, and toad-flax in clefts; a trail of moneywort. At the bottom of the wall were asters, bidens, touch-me-not, and others. I thought the planting could have been improved, but it was much better than some of the laborious attempts to be seen. The setting of this natural planting was interesting. A small flood-stream had worn a path on the rock from top to bottom, and this bare line, exposing the strata, threw the vegetation into relief. Moreover, the entire scene was part of its background.

I know a rocky face under a bridge where *Primula mistassinica* grows, a choice lilac-blue northerner that persists, probably from glacial times, in these gorges. It is a lovely thing, well set among a variety of native things; yet I never heard anyone speak of the place as a rock-garden. There is a great rock wall covered deeply with the delicate *Cystopteris* or bladder-fern, the admiration of visitors, with tufts of other things springing through; I have never seen a gardener's fern-garden as good.

For some years my eyes have been open for natural cliffs and rock-faces, old quarries and stone dumps, to note the natural vegetation; they have seen them across and across the con-

Rock-Garden

continent, and on other continents and islands beside. The more one sees of them the more one finds to admire.

I highly esteem the rock-gardens made by skilled hands, and have tried to know every plant customarily grown in them in this country and Europe, and am in sympathy with the rock-gardening interest now spreading in North America, although more, perhaps, because it will be one more agency for the popularizing of knowledge about plants. The rocks are not the important part of it, particularly when they are out of place. A woman on the prairies told me that they were making rock-gardens where rocks for the purpose had to be transported two hundred miles. Persons who have had natural rock ledges on the premises blast them out and make a pond; and in the same region men with natural hollows on the premises fill them up with piles of rocks and think they are making a rock-garden.

We appear not yet to have conceived the idea of a rock-garden furnished with regional native plants that naturally thrive in such places. We cling too imitatively to the Old World types, and spend endless pains with plants that are unadapted to our conditions. Some of the exotics thrive well, but it is a question whether even these should provide the dominating feature in North America. We need a new and native idea in rock-gardening, although not to

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the exclusion of European patterns. An effort developed along original lines should stimulate study and appreciation of the native flora.

For sheer daintiness and beauty many of the rock-garden subjects are in a class by themselves, but they do not exhibit their charms when treated casually as if they were weeds. One has only to turn the pages of such a work as Farrer's two heavy volumes on "The English Rock-Garden" to become convinced of the wealth of interest in these plants. To grow such plants successfully requires good intellectual preparation, and this should be one of the recommendations of rock-gardening. One should find new experiences in propagation and keen delights in the mastery of the subject.

Verily, a rock-garden is not a clever assemblage of stones with certain plants growing among them. There can scarcely be "a movement" for rock-gardening, for a real rock-garden is a personal accomplishment of years of patient effort and it is born of a closer knowledge of plants than most other forms of gardening; the idea is not catching from person to person. I do not see how rock-gardening can become a vogue if it is really horticulturally successful. The true rock-gardener slowly and accurately learns the kinds and requirements of saxicolous plants, fitting them into their places year by year until finally he assembles a thriving collection as complete and perfect in its way

Rock-Garden

as an old greenhouse full of choice and personal subjects. He may attempt alpine, and this will prove his skill. He has first chosen the place with discrimination and has gone at the work as a source of permanent pride and satisfaction. Let us hope he has made the garden part of an artistic arrangement of the domain; the product stands by itself without comment or explanation.

9. *The Fruit-Garden*

I bring tokens from the middle of the past century.

“The subject of this treatise is one in which almost all classes of the community are more or less practically engaged and interested. Agriculture is pursued by one class, and commerce by another; the mechanic arts, fine arts, and learned professions by others; but fruit culture, to a greater or less extent, by all.

“It is the desire of every man, whatever may be his pursuit or condition in life, whether he live in town or country, to enjoy fine fruits, to provide them for his family, and, if possible, to cultivate the trees in his own garden with his own hands. The agriculturist, whatever be the extent or condition of his grounds, considers an orchard, at least, indispensable. The merchant or professional man who has, by half a lifetime of drudgery in town, secured a fortune or a competency that enables him to retire to a country or suburban villa, looks forward to his fruit garden as one of the chief sources of those rural comforts and pleasures he so long and so earnestly labored and hoped for. The artizan

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who has laid up enough from his earnings to purchase a homestead, considers the planting of his fruit trees as one of the first and most important steps towards improvement. He anticipates the pleasure of tending them in his spare hours, of watching their growth and progress to maturity, and of gathering their ripe and delicious fruits, and placing them before his family and friends as the valued products of his own garden, and of his own skill and labor. Fortunately, in the United States, land is so easily obtained as to be within the reach of every industrious man; and the climate and soil being so favorable to the production of fruit, Americans, if they be not already, must become truly 'a nation of fruit growers.'

"Fruit culture, therefore, whether considered as a branch of profitable industry, or as exercising a most beneficial influence upon health, habits, and tastes of the people, becomes a great national interest, and whatever may assist in making it better understood, and more interesting, and better adapted to the various wants, tastes, and circumstances of the community, cannot fail to subserve the public good."

The quotation above is from the introduction to the original edition of Patrick Barry's "Fruit Garden." This was a notable book of its day. It was published in New York by Charles Scribner in 1851, again in 1857 in Auburn and Rochester, New York by Alden &

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Beardsley, in 1860 again in New York City by C. M. Saxton, Barker & Co., and in 1863 in Rochester by the same publishers, in 1872 in New York City by the Orange Judd Company and again by the same in 1883, and for aught we know at other times; all this attests to its value and its popularity. With all the burning enthusiasms of the present day in the commercial conquests of the fruit men, we can hardly match the fervor of this artistic piece of writing; and in comparison with it much of the contemporaneous writing, compounded on the typewriting machine, lacks sadly in color and personality.

Evidently there was a spontaneity in that epoch that is impossible of attainment in these times of institutionalism and standardization. Probably it is not alone the memories of youth that give those days their flavor to me. There was something very real in the animation of that period, when the frontiers were expanding, when hope was in every migration, and when every new thing was tried and persons were not obliged to wait for official tests. To be sure, I do not go back to the first edition of "The Fruit Garden," but it was my great happiness to have known Patrick Barry, Charles Gibb, John J. Thomas, Marshall P. Wilder, C. M. Hovey, and others whose lives did not reach the present century. There was a certain masterfulness in those men, born of long experience and varied

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interests. Most of our first great horticulturists were fruit men although not to the exclusion of other attachments. Their names have come to us as symbols of authority, and yet their reputations were made on small areas or at least in activities that would now seem to be circumscribed. They were amateurs in the best sense. Consider Wilder's interest in his importations of the best pears and camelias, yet a business man in Boston. Turn over the pages of Hovey's Magazine of Horticulture. Note Gibb's introductions of the Russian fruits. Remember that Thomas wrote on many subjects. And Barry's "Fruit Garden" is directly a book for the amateur; probably not yet has a work on commercial fruit-growing exerted such an influence.

Consider also the Downings, who stand in the forefront of American horticulture. I remember my father writing to Charles Downing from what was then considered to be the western wilderness asking for cions of the Surprise apple that he might add it to the many varieties growing on his place and offering to pay for them; and Downing sent the cions and wrote in his own hand (there were no typewriters then) that there was no charge to those who loved fruits. I set those cions; and for many a year made pilgrimage to the tree and opened the green fruits to be surprised again and again at the pink flesh, "stained with red" as the

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original "Fruits and Fruit Trees of America" has it; and indeed it was "of little or no value," as the account says, but father and I knew that it paid its keep (there was no cost-accounting then). I have not seen this variety in any number of years; if any man still grows it, will he not send me a fruit when it is ripe?—and I shall not even offer to pay for it.

An instructive history may one day be prepared from the lives of the masters in American pomology. These lives had quality and breadth of view, but the main contribution was the fact that they associated fruits with the home life. I cannot forget Charles Downing's fruit-house which I early photographed and of which an illustration was made for the first *Cyclopedia of Horticulture* and repeated in the second. Here was a place in which numbers of varieties of fruits could be kept, always accessible for "testing" on occasion. The early exhibitions of fruits turned mostly on entries of "plates" rather than on "packs," and the samples were painstakingly judged for excellence and quality; and the judgments were opinions of chosen men, not footings of score-cards. One wonders whether there ever will be a recrudescence of this kind of pomology?

* * *

Patrick Barry wrote of fruit-growing for the home garden. He would expound "the art of

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planting fifty trees on a quarter of an acre of ground, and bringing them into a fruitful state in four or five years at most." He begins the book with a chapter on "names, descriptions, and offices of the different parts of fruit trees," to the end that the grower might have close and sympathetic relations with the tree itself. Now, when we write books about crops, we are likely to begin with census figures.

The "new planting spirit" was abroad when Barry wrote; "until within a few years nothing was said or known among the great body of cultivators, or even nursery-men, of dwarfing trees." Yet he declares that "nothing so distinguishes the taste of modern planting as the partiality for dwarf trees, and the desire to obtain information in regard to their propagation and treatment," and he set out to supply information "in regard to the management of trees in the more refined and artificial forms."

Except in pears, the demand for dwarf fruit-trees was apparently not of long duration. The dwarf pear tree was a commonplace in my boyhood and many excellent plantations were in their prime when I entered my teaching work; today dwarf pears are offered little by nursery-men, nor, in fact, few pears of any kind outside a very few commercial sorts, and they have largely gone out in the East. Hedrick remarks in the notable "Pears of New York," published in 1921 as a report from the New York Agri-

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cultural Experiment Station, that "a dwarf orchard or even a dwarf tree is now seldom seen." A worthy effort to revive and extend an interest in dwarf fruit-trees was made in 1906 by Waugh in a book on the subject.

But the trend of gardening enterprise runs to roses, irises, peonies, rock-gardens and many other colorful subjects and the fruit-garden of Barry's day is yet essentially unrealized as a recognized effort. This is a vast pity, for not only is the fruit itself of prime interest and value but the care required in the rearing of it brings one into the most intimate relationship with the plant and should afford a singular mental training. Nothing more clearly shows the skill and devotion of the horticulturist than the ability to grow good fruit in a small space, even though the subject is not essentially difficult; and the fact that such fruit-raising is not the vogue should be specially suggestive to one who desires to find a personal expression.

There was probably greater interest in the planting of fruits when Barry wrote and shortly afterward than ever before in North America. He attributes the beginning of this impulse largely to Downing's "Fruits and Fruit Trees of America," 1845, "the first treatise of the kind that really obtained a wide and general circulation." This book made its appearance, he states "at a favorable moment, just as the

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planting spirit referred to was beginning to manifest itself, and when, more than at any previous period, such a work was needed. Mr. Downing enjoyed great advantages over any previous American writer. During the ten years that had elapsed since the publication of Kenrick's and Prince's treatises, a great fund of materials had been accumulating. Messrs. Manning, Kenrick, Prince, Wilder, and many others, had been industriously collecting fruits both at home and abroad. The Massachusetts Horticultural Society was actively engaged in its labors. The London Horticultural Society had made great advancement in its examination and trial of fruits, and had corrected a multitude of long-standing errors in nomenclature. Mr. Downing's work had the benefit of all this; and possessing the instructive feature of outline figures of fruits, and being written in a very agreeable and attractive style, it possessed the elements of popularity and usefulness in an eminent degree."

Barry gives just praise also to Thomas' "American Fruit Culturist," which first appeared at Auburn, New York, near which Mr. Thomas lived, in 1849. Cole's "American Fruit-Book," 1849, is also commended. "Besides these, periodicals devoted more or less to the subject, have increased in number and greatly extended their circulation, so that information is now accessible to all who desire

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it." Hovey's "Magazine of Horticulture" and Downing's "Horticulturist" were then in full life. Meehan's "Gardeners' Monthly" began in 1859. Purdy's "Fruit Recorder," which undoubtedly had great influence on fruit-culture, began in 1869 and continued until 1886. But now it cannot be said that the agriculturist, "whatever be the extent or condition of his grounds," considers an orchard indispensable; nor does the merchant, professional man and artizan commonly contemplate the planting of fruit-trees. Home-production of all kinds has mostly gone out. Fruit-growing, like other enterprises, has become specialized. The fruit market is supplied regularly in standardized sizes and containers. It follows that the variety has been reduced, and if one wants fruit of a particular and superior kind one must expect to grow it. We have felt that a recrudescence of home fruit-culture would stimulate the market for fruit by increasing the knowledge and desire of it and incite a wholesome emulation and thereby be to the advantage of both the home grower and the commercial grower.

* * *

Many years ago I planted rather heavily of dwarf apples and they did well as long as they received particular care. Two hundred trees were imported from France. Many others were propagated to choice kinds on imported

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Paradise-apple roots, and these were most satisfactory because the varieties were better suited to my needs. For years they bore heavily and the fruit was superior, as my friends and the market testified. Most of the trees were set between standard apples with the idea of removing them when the larger trees needed the room. They are apparently as permanent, however, as standard or "free" trees if properly cared for. They are not to be planted in this country for commercial apple-orcharding, but they are readily grown and are capable of giving much satisfaction to the amateur. One should not attempt to grow common commercial apples on the dwarf stocks. Only choice dessert varieties should find place in the dwarf orchard, and the total yield is less important than the high quality of the product. The only published result of my work with the dwarf apples is Waugh's vivid (and truthful) comment that I had had a lot of experience but did not know what it was.

One develops a sense of permanency when one plants fruit-trees, particularly of the long-enduring kinds as sweet cherries, pears, and apples; and with the other tree-fruits and the dwarfs one feels that the work is not for a season or a year but for a long term, perhaps even for a lifetime. In 1760 John Bartram planted in his garden on the Schuylkill a pear tree sent from England by Lady Petre; more

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than one hundred and twenty-five years later I took cions from the tree and set them in a young pear of my planting, and the tree is still fruitful. Plantations of some of the bush-fruits last any number of years if well cared for. A fruit-growing effort is peculiarly adapted to the settled home, where one expects to abide. The years come and go, and the trees hold their place and grow better and more characteristic with time; the element of maturity is in them. The spring will see the bloom, and another and another spring will see it again on the same tree, the tree grown older, more fruitful and more worth the while. It is the pride of the grower to make sure that it is more worth while. The autumn year after year will fulfill the promise of the year, and the product will fill the baskets.

* * *

Of every tree, whether pear tree or elm or sassafras, the seasons make a harbinger. I knew two oak trees intimately for some years, seeing them practically every day. I knew their blooming in relation to each other and the shedding of their leaves. Their autumn colors were peculiar shades and every year of the same quality each of itself. I wrote of them one autumn long ago: "the oak on one side my doorway is maroon-red and that on the other side is

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veiny-yellow, and they have been the same in all the Octobers in which I have loved them." And now my elms and maples are the same to me. Some of them leaf out late in spring, some early, and they shed their leaves in something like a succession. We do not know why; perhaps that is one reason why we like them so well. The fruit-tree becomes more distinctly an entity because one knows it so much better by closer care of it. Its vicissitudes and its welfare are more particularly ours. The love of a tree, especially if identified with a home, is one of the sacred associations.

Some twenty-five years ago I wrote my appreciation of a certain elm tree that tragedy had overtaken and printed it in *Country Life in America*. The manuscript of it is now before me, and the theme of it so well suits the present purpose that it is placed here to complete the sentiment; for a fruit-tree is kin to every other tree.

In a long row of noble roadside maples was a single elm tree. It was planted where a maple had died. With large maples on either side and an orchard at the back, it had to struggle for light and moisture and food. Younger and smaller than the other trees, it was the special attraction of roaming cattle and the particular mark of mischievous children. The soil was too dry to suit an elm tree. Yet, in spite of

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all these disabilities, the tree grew and flourished.

Every passing storm seemed to wreak its vengeance on this elm tree. One late winter morning we awoke to find the world transformed by ice on every tree and bush. In wonder and amazement we looked abroad. But in front of us the elm tree lay a shapeless mass, broken and splintered by the weight of ice. Already the tree had been endeared to us by its many hardships, in which all the family had sympathized. The tree must not perish now.

With ropes and pulleys the great limbs, some of them now several inches in diameter, were drawn back to their places; for every one of them still clung to the parent stock by a strip of bark and wood at its base. Iron bolts were made from half-inch rods, long enough to reach through branch and stock just above the split. With long auger, half-inch holes were bored through the tree, the bolts driven in tight and then drawn up by means of a nut and thread. A large head and washer, and another washer under the nut at the other end, prevented the ends of the bolt from drawing into the wood. So firmly was the branch drawn to the trunk that no gaping crack was left, and the crease was hermetically sealed with melted wax. Then higher up, between branches two or three feet apart, other rods were run to hold all

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the members in place. We knew that if the bolts fitted tight in their holes, no harm would come to the tree; but that if bands were placed about the branches they would soon crease and girdle the parts and work much injury. When the storm had passed, the tree stood in its customary mood; and all the following summer it grew as if with renewed determination.

Nor was this the last of its misfortunes. Again an ice storm severed the great head until its branches lay prone on the ground. Now it was necessary to reduce the weight of the fallen branches, so long and large, by removing several feet of their ends. We knew that this cutting back would also tend to concentrate the new growth near the base and therefore to lessen the chances of another wrecking until the splits were well healed. Then again the parts were raised and bolted, and again the tree took up its thread of life undaunted. The old man who cared for this tree had fought his way through many obstacles; but he did not know why it was so dear to him.

The old tree is two feet in diameter now. Its iron bolts are all overgrown and no visible trace of them remains. It is no longer protected by cattle-guards. It has overtopped the maples. Birds build their nests in it. Now and then I wander along that old roadside. I admire the avenue of great maples and hear the praises of them from fellow travelers. But when I come

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to the old elm tree, almost unconsciously I throw an arm around its sturdy bole and bury my fingers in the furrows of its bark.

* * *

But it is the fruit-tree that is specially celebrated on this occasion. The fruit-tree differs in the fact that it has been so propagated that it bears a particular variety of fruit, and it should be more carefully pruned than are the trees grown for ornament or shade. The seed from which the tree made its start reproduces the species only, *Prunus avium* if a sweet cherry, *Pyrus communis* if a pear, *Citrus sinensis* if a sweet orange. But the particular variety, whether Windsor or Napoleon, Bartlett or Seckel, Navel or Valencia, lies in the wood rather than in the seed, and a cion or cutting of it is inserted in the seedling stock to become the bearing part of the future tree. Sometimes the plant grows straight from a cutting, as the grape, and directly produces the given variety. I am not making these statements for the unnecessary purpose of giving information but to illustrate how close is the relation between a fruit-tree and a man.

Yet it is in the pruning that this relation is best expressed. Day after day I have been alone with the trees, with a knife, shears and a light saw, and have convinced them into the ways that they should go. The trunk is to be

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so tall; the main or scaffolding limbs just so many; the height and shape of the future head are anticipated; the branches that will interfere are removed. Ten years from now the tree will express my handiwork and my judgment. Let us trust the result will be good.

The reader has been so patient with me for having introduced an old article that I venture to repeat the indiscretion. Before me is a manuscript on "the fruit-tree" that surely was written years ago and which probably was published but I do not know where, perhaps for children somewhere. We may use at least part of it. The essay must have been written when my pen was nimbler than now, and if the reader does not like it he has the alternative of passing it by; and that will close my plea for the fruit-garden.

By the woodshed or the pump, or against the barn or the garden fence, the apple tree or pear tree connects the residence with the world of life and space that stretches out to woods and farms. We transfer our affections to it, as a half-way place between ourselves and our surroundings. It is the warder of the fields and the monitor of the home. It is an outpost of the birds. It feels the first ray of morning sunshine. It proclaims every wind. It drips copiously in the rain. Its leaves play on the grass when the year goes down into the long night of winter. And in the spring its brightening

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twigs and swelling buds reveal the first pulse in the reviving earth. Every day of the year is in its fabric, and every essence of wind and sun and snapping frost is in its blossom and its fruit.

I often wonder what must have been the loss of the child that had no fruit-tree to shelter it. There are no memories like the days under an old apple tree. Every bird of the field comes to it sooner or later. Perhaps a humming-bird once built on the top of a limb, and the marks of the old nest are still there. Strange insects are in its knots and wrinkles. The shades are very deep and cool under it. The sweet smells of spring are sweetest there. And the mystery of the fruit that comes out of a blossom is beyond all reckoning, the magic growing week by week until the green young balls show themselves gladly among the leaves. And who has not watched for the first red that comes on the side that hangs to the sun, and waited for the first fruit that was soft enough to yield to the thumb!

And an orchard is only a family of fruit-trees. Orchards are also very real, but I hope that we do not lose the feeling of the tree. Our affections cling to trees, one by one; and then the orchard becomes almost a sacred spot. A fruit-tree in full load is one of the marvellous objects in nature. We cannot understand how the work is done,—how such abundance is produced and how such color and substance and

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flavor and faultless form are derived of the crude elements of soil and sunshine and air. It gives of itself out of all proportion to the care and affection that we bestow on it. It is a very sermon in liberality. It is a great thing when the making of orchards spreads rapidly, for it means not only commercial thrift but a growing appreciation of the tender and refreshing products of the earth.

9. *Markets and Catalogues*

This year I have been interested in the vegetables in the market. I am impressed with the excellence of them and also with the limited variety. Of lettuce one kind has practically supplied the demand, yet in a seedsman's catalogue before me are about two dozen varieties. About the same proportion runs through all the classes of vegetables. In the catalogue more than 450 kinds of vegetables are listed and most of them are described with considerable care. It is doubtful whether ten per cent of them have been in the markets.

The first inference is that the catalogue has too many kinds, and this is a common assumption. To this one cannot agree. One is impressed with the emphasis on quality in many of the descriptions and this suggests a strong home demand. There are also very many conditions to be met in a country of continental extent and many desires to be satisfied. The practice of the seedhouses is founded on experience and we should not expect them to offer extensive lists if nobody wants the varieties. It is to the interest of commercial growers and packers to

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reduce and standardize the lists, but this is an exigency of business and in no sense indicates what may or should be grown at the home. There is often apparent scorn for what are called "novelties" and I have had my experience with them, but there is charm in novelty itself. Undoubtedly the novelties now offered by seedsmen are desirable, even if some of them afford no intrinsic improvement over older kinds; the element of diversity may be worth the while, and it should be encouraged for the home grower while allowing the market man to standardize his practice as far as he thinks he needs.

The seed catalogues have allured me from boyhood, and probably their charm for me is greater now than ever. It is pleasant just to read about the things and to see the pictures. One anticipates what they will be like. A seed-packet is a veritable magic. One wants to see how the seeds look, to examine them under a lens for their special shapes and markings; and one wonders what dynam is in them to cause them to break the shell, lift the ground, appropriate everything within reach and result in a structure a thousand times their own dimensions; and one marvels that they respond to certain conditions more than to others, that they have their own methods and habits, that the resulting plant comes to flower and maturity at a particular season, and that we cannot

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discover how they do it. One need not be afraid of novelties as long as they are real and not new names for old kinds.

When I go from the seed catalogue to the market I am impressed with the fact that if we want these many things we must grow them ourselves. We should be able to realize the possibilities in vegetable-growing as well as in anything else. By growing at home one may choose varieties not for size, external appearance, heavy yield or shipping character but for table quality. Many of our people little know what is meant by such quality in table vegetables or what it means to have the things fresh from the ground when ripe, with the bloom or the dew on them, before they wilt and without the necessity of sprinkling to hold them in condition. Even the indestructible cucumber has a crispness and quality when fresh from the vine and before the life has begun to go out of it that is not attainable under usual market conditions. There are choice kinds of water-melons easily grown in a home garden of fair dimensions, although the fruit may not be ponderous; but most of us know only the imperishable melon of the markets.

Not alone from the point of quality but in ease of housekeeping is the kitchen-garden worth the effort. To be able to go to the garden for even a part of the daily supplies is a great comfort to the housewife. To be sure, the

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householder cannot grow everything, fruits, vegetables, and flowers; he must make his choice, but on any ordinary premises something can be grown as a regular part of the program of life.

Let us also suggest other things beside fruits and vegetables and flowers. There is a great class or assemblage of garden subjects that might be called "plants of general interest." They may not be ornamental, or edible in our particular dietary, but may have historic and literary interest. Many of them are listed in catalogues, particularly in certain of the foreign ones. I remember my delight when I first grew the Biblical cumin; I have had the satisfaction of growing the lupines of the ancients; oddities of French horticultural literature; the mustards of China, Japan and India and other regions and which contribute so importantly to the dietaries of the peoples of those countries; medicinal plants; it was not till last year that I grew the real resurrection plant (or rose of Jericho) from seeds to maturity, although I had purchased the dried balls. Of many kinds of staple agricultural crops I have many times grown a few plants in my garden,—many kinds of oats, barley, the classes of wheats, rye, the sorghums and kafirs, buckwheats, millets, rape, tobaccoes, peanuts, vetches, clovers, grasses, and I think all the sweet herbs and any number of unusual things.

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These are all simple plants to grow but they have been worth while to me. It is great sport to know all the varieties of a certain vegetable, as peppers, that one may obtain a view of the characteristics and nature of the group and see it as a whole; one is then qualified to read about it. From all these experiences one is lead into the accounts in books; this takes one on interesting and useful quests in encyclopedias and libraries, and I see no reason why it should not provide real entertainment.

* * *

It is strange how little literary record we have made of the varieties of garden vegetables as compared with the varieties of fruits. Of books on varieties of vegetables we have one in this country, long out of print, Fearing Burr's "The Field and Garden Vegetables of America," 1863 and 1865, and an abridgement in 1866. The original Burr is an outstanding book. For many years I had an intention to compile a volume on the same lines for my own day, but this delightful quest must now be left to others. Burr wrote before the days of experiment stations and of test grounds as we now know them. To obtain the information he tells us that he grew the plants, "seeds of nearly all the prominent varieties having been imported both from England and France, and planted, in connection

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with American vegetables of the same name"; in this way he sought "to secure accuracy of names and synonymes." Subscribing himself at Hingham, Massachusetts, in March, 1863, he wrote "That the volume may be acceptable to the agriculturist, seedsman, and to all who may possess, cultivate, or find pleasure in, a garden, is the sincere wish of the author." This was before the days of the great development of trucking.

The purpose of the volume, as Burr states in the preface, might well be applied to a work of the present time, were there such a one: "Though embracing all the directions necessary for the successful management of a Vegetable Garden, the present volume is offered to the public as a manual or guide to assist in the selection of varieties, rather than as a treatise on cultivation. Through the standard works of American authors, as well as by means of the numerous agricultural and horticultural periodicals of our time, all information of importance relative to the various methods of propagation and culture, now in general practice, can be readily obtained. But, with regard to the characteristics which distinguish the numerous varieties; their difference in size, form, color, quality, and season of perfection; their hardiness, productiveness, and comparative value for cultivation,—these details, a

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knowledge of which is important as well to the experienced cultivator as to the beginner, have heretofore been obtained only through sources scattered and fragmentary. To supply this deficiency in horticultural literature, I have endeavored, in the following pages, to give full descriptions of the vegetables common to the gardens of this country."

It is not to be inferred that varieties of vegetables have not been studied in recent time, for the contrary is the case. Many of the publications of the United States Department of Agriculture and the experiment stations are good contributions in this field. Even before the establishment of stations on a federal basis, following the Act of Congress in 1887, the "testing of varieties" of vegetables had been undertaken and results were published in bulletins. As early as 1889, the Association of American Agricultural Colleges and Experiment Stations had set up a committee on nomenclature which in that year reported a set of rules for the naming of kitchen-garden vegetables; the two other members of the committee have now been called to close their labors. In 1903 a great organized list of American varieties of vegetables for the years 1901 and 1902 was published by the United States Department of Agriculture, compiled by Tracy. With such interest in the subject and accumulation of information it is strange that Burr has remained our only

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cyclopedia of varieties of vegetables; but fortunately the deficiency is now soon to be met with a work on a competent basis.

* * *

To me there is a charm in the vegetable-garden plants that belongs to no other department of horticulture. Many times I have tried to analyze this appeal but without success. The fact that these plants so quickly come and go, grow so rapidly to maturity and often to such great size, and that the product is so remarkably diverse, may constitute some of the elements of the fascination in them. A pumpkin vine is always a marvel. Between the frosts of spring and autumn it covers a great expanse and produces enormous fruits in the bargain; and the numerous golden goblet-blossoms busy with bees are as good as anything in the garden. One can understand how the gourd plant came "up over Jonah, that it might be a shadow over his head." One spring I planted seed of an oriental gourd in my greenhouse. It covered a long bench, ran out the ventilators at the top of the house, down the roof and on the ground, full 100 feet by the time frost overtook it. Such energy is quite beyond comprehension. The reasons for the protean shapes of the cucurbit fruits are yet to be uncovered. For some years I grew and crossed them extensively, on acres of ground, but the shapes were no more various

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from my crossed plants than from others. I tried to trace the lines of variation, but became so lost in the tangle that I reported some of the experience in an article on "A medley of pumpkins." With our present knowledge of line-breeding, mendelism, chromosome characters, and methods of control we ought soon to make a successful attack on this problem of the gourds. But we should be skilled in the identification of them before we purposely mix them up any further. The origin of these plants in nature is not yet known. Of the three species of food plants of "unknown or entirely uncertain origin" following DeCandolle's extensive investigations, two are cucurbitas; the other one is the common bean. Such situations as this challenge the interest of the garden lover.

* * *

As to the marketing of horticultural produce, one must accord the present practices high admiration, even admitting that they may be yet inadequate from the grower's point of view. Certainly there is great advance over the conditions of twenty-five years ago, to go no farther back, when supplies in the markets were less dependable and when the losses were greater. Marked talent has been expended in supplying the needs of the people for vegetables, flowers and fruits at the times and in the quantities they desire. Some of the special

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systems, as the florists' telegraph delivery, are outstanding accomplishments even in an epoch of great commercial achievement. One is justified in looking forward with confidence to more fully developed systems in the next quarter century. If markets in the nature of the case cannot always supply the highest and most delicate quality in varieties, it is to be remembered that they nevertheless provide the people everywhere with commodities that heretofore have been practically unavailable.

As to the catalogues, they have exerted great influence on the development of horticulture. To thousands of people they have been the guides to garden and field practice and have stimulated curiosity as to the kinds and variety of vegetation. Persons of my generation, to cite a particular case, will recall the influence exerted by Vicks' catalogues in the growing of flowers. One finds the catalogues of seedsmen, nurserymen and other plantsmen both interesting and dependable. Many of them are artistic, and most of them dealing with species give careful attention to nomenclature and they lead in the reducing of confusion in names. The educational value of the catalogues must be acknowledged in any adequate account of horticultural progress. It is a pity that there are not complete archives of all the horticultural catalogues from the beginning in several

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places in the country. They will be increasingly useful records for students of plants as time goes on.

* * *

I went from the market to the catalogues, and learned that many things have been missed. I went from the catalogues to the markets and found many things as good as expected. In these circumstances I have responsibility in the situation and should supplement the markets with the products they cannot supply by raising some of them myself.

11. *The Botanic-Garden Idea*

In November, 1925, on the invitation of the Ohio Botanic Garden Society, I gave an address in Cincinnati on the botanic-garden idea. Subsequently the address was printed for the use of the Society. The paper was in four subdivisions, one of which was devoted to the Cincinnati region as a setting for a botanic garden, for it happens that I had given some attention to that neighborhood more than thirty years ago because of the important part it had contributed to our horticultural history; this subdivision of the paper need not be reprinted, but the other divisions, somewhat modified and with a few omissions and considerable additions, are entered here as an essential part of my general theme.

* * *

Vegetation is the pleasantest furnishment of the earth. Every person is in contact with it. The progress of the seasons for every generation of men is expressed by it. The earth would be a desperate place without it. The lives of animals and men are conditioned on it. Vege-

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tation is limitless in variety and beauty. Even after it supplies man's physical necessities, it exerts unaccountable influence on the mind of the race. Knowledge and appreciation of vegetation are powerful educational factors, and these assets may be employed to much greater effect than we are yet aware.

A botanic garden is one of the agencies for the diffusion of knowledge of the vegetable community, although its significance is little understood or appreciated amongst us. The botanic garden is of early origin, but it has not yet been applied to any extent to the needs of modern life because the establishments are so few. As its possibilities are understood, the botanic garden will come to be an essential form of public expression and service, comparable with institutions now well accepted as municipal and corporate undertakings.

The plant world is yet very imperfectly known; and the knowledge of it needs to be disseminated and applied by institutions in every large area or geographical region, and to every generation. Up to 1900 more than a half million Latin names had been applied to species of phanerogams or flowering plants; probably half or more of these names are synonyms or duplicates. There are great numbers of the so-called flowerless plants (ferns, mosses, fungi, lichens, algæ, and still lower forms), the study of which is also the proper province and func-

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tion of a botanic garden. Whether we yet know more than half the plants of the earth obviously cannot be stated, but we are aware that great numbers of new species are now being described from all quarters of the globe and many of them from regions long supposed to have been thoroughly botanized; apparently there was never so great activity in the describing of species as in the last quarter century; probably within this period nearly or quite 200,000 Latin binomials for flowering plants have been recorded or revived.

Probably less than ten per cent of the flowering plants and ferns are known to cultivation, and the greater part of these kinds is of minor consequence to us; the number that contributes the main food and fiber supplies to man is less than one hundred species. We do not know whether all the potentially most useful plants of the earth are yet ameliorated or, in fact, whether they are included in those that happen to be cultivated. And, moreover, probably relatively few if any of our leading domesticated plants are yet developed to their full capabilities. And yet again, the plants of the earth have an interest and significance to us quite independent of their economic uses. What treasures the vegetable world still holds for mankind is one of the important and attractive problems for the future to solve.

With this point of view before us we may

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intelligently proceed to the discussion of the botanic-garden idea for the present occasion under three subdivisions:

- I. Definition and general purposes of a botanic garden.
- II. The purposes, plans and property.
- III. The results.

I. Definition and Scope

A botanic garden is an institution growing a general collection of plants for the purpose of developing a careful appreciation and understanding of the vegetable world. It assembles material, organizes it, and makes it available for study. It is constituted with the intention to investigate, to stimulate interest in plants, and to popularize knowledge of their characters and qualities, uses and cultivation. It is an educational institution, scientific in character because we cannot dispense knowledge until we have it.

Three classes of activities belong to an effective botanic garden: investigation, education, permanent publication. To accomplish its ends, the institution must have an endowment or an assured income in its own name definitely devised to the enterprise. It must maintain a professional staff of highly trained persons. It is committed to the public interest and the furtherance of science.

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The institutional botanic garden has its own program, as definitely as a college has its curriculum. It should be a dynamic effort that makes itself felt, not merely a static museum or pleasure to which persons may repair if so inclined. Such an institution is essentially a modern or recent development. We must discriminate between it and various other kinds of establishments, all of which may also be of high significance and utility. It is not a commercial undertaking, nor a real-estate development, nor yet a recreation park. It is to be distinguished from botanical stations which are adjuncts to other enterprises or institutions, from the test grounds of experiment stations, from plantations devoted to a special or particular problem. It is different also from the gardens and grounds (of which we should have more) maintained as part of the student teaching equipment of a college or university; some of these gardens, however, because of their age, associations or distinctness are quite in a class by themselves, as the old Botanic Garden of Harvard University at Cambridge.

As intended under the foregoing definitions there are three botanic gardens in America north of the tropics, now established and in operation and regularly publishing: The Missouri Botanical Garden, begun as a private property in 1859; New York Botanical Garden, founded in 1894; Brooklyn Botanic Garden,

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1910. In none of these institutions can there be grown permanently out of doors a palm, orange, banana, pineapple, eucalyptus; this fact testifies to the need of other institutions in different parts of the country.

Aside from these institutions are three arboretums, which are botanic gardens restricted to trees or woody plants: the notable Arnold Arboretum of Harvard University, established in 1872; the Morton Arboretum in northern Illinois, 1921; the new Boyce Thompson Southwestern Arboretum in Arizona.

Other establishments apparently coming within one or the other of these categories are projected or in process of formation.

Long before any of the gardens just mentioned were founded, important collections, particularly of trees, had been assembled for their botanical interest. The first of these gardens was that of John Bartram (1699-1777) at Kingsessing on the Schuylkill River, established in 1728. Bartram was a natural botanist and a man of great ability. He introduced many species, both native and foreign. Some of the venerable trees still stand, now incorporated in the Park system of Philadelphia. In 1773 Humphrey Marshall, Bartram's cousin, began a tree garden in eastern Pennsylvania, and in 1785 he published the first work on American trees, "*Arbustum Americanum*"; the names of many of our trees and shrubs date from this

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important contribution. Subsequently other private persons established important collections, so that the country has not been without living museums of this kind from the time of Bartram to the transfer of the Shaw garden to trustees for permanent public use.

While a botanic garden is not in any sense a commercial undertaking, it should recognize the aid that the commercial establishments are able to render. In the history of American horticulture, before the time of experiment stations and public trial grounds, the nurseries made conspicuous contributions to horticultural knowledge. The first of these institutions was the Linnæan Garden established by Prince at Flushing, New York (Long Island) apparently in the century before last. The Princes, in four generations, were nurserymen of ability, and two of them wrote horticultural books. The Linnæan Garden exerted great influence. Other nurseries that acquired some of the features of botanic gardens followed the enterprise of the Prince family, a few of which may be mentioned. Samuel Parsons, with his brother Robert, entered the nursery business at Flushing in 1839, and the collections became notable. Patrick Barry served with the Princes four years, and in 1840, with George Ellwanger, established the Mount Hope nurseries at Rochester, and they soon became known for their extensive variety of plants. John Saul's impor-

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tant collections at Washington began in 1852; Thomas Meehan's at Germantown near Philadelphia in 1853; Prosper J. Berckman's, Augusta, Georgia, in 1857. Many of the contemporaneous nurserymen maintain large collections for observation and test, and are influential aids in the dissemination of knowledge of plants.

An institutional arboretum differs from a botanic garden in being limited to trees (Latin *arbor*, tree). In common usage, however, it includes also the fruticetum (Latin *frutex*, shrub) or shrub garden; that is, it is devoted to the growing and study of woody plants. There is no natural line or division between woody and non-woody plants, and an arboretum makes an arbitrary cleavage in the vegetable world. There are good practical reasons, however, for the establishment of arboretums, as for the pursuit of other specialities. The concentration of attention to a particular range of vegetation is likely to yield excellent results. Sometimes an arboretum is a recognized part of the botanic garden, as at Kew, and of course all botanic gardens expect to grow woody plants as far as space and facilities permit. But I deplore the use of the word arboretum when botanic garden is meant, not only because it is untrue but because it limits the scope and application of the institution; the word should be restricted to its legitimate important field.

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Alphonse DeCandolle estimates that herbaceous perennials constitute about forty per cent of the seed-plants; the biennials are probably one or two per cent and the annuals are very numerous. Very few of the ferns and allies are woody, and none of the lower orders. An arboretum, therefore, if true to its name and history, devotes itself probably to much less than one-half the vegetable community. It does not concern itself with the great food crops, most of the florist's plants, many of the drug plants, with greenhouse work as such, nor with the usual ranges of agriculture aside from forestry. The educational value of a botanic garden lies considerably in the fact that it presents a comprehensive view, or at least a cross-section, of the vegetation of the earth.

A botanic garden may study plants in any or all of their aspects and relationships, although it is naturally expected that the institution will have critical knowledge of the kinds of plants it grows and perhaps publish on them. Its living collections should be as extensive as possible, and skillfully grown. The general fields of plant knowledge may be stated broadly as systematic and taxonomic, genetic, ecologic, horticultural, agronomic, anatomic, physiologic, pathologic, medical, industrial. It is not expected, of course, that such an institution shall restrict itself to the kinds of plants that it grows on its grounds; on the contrary, it must

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take a much broader view, if it is to understand the plant world, and may well study the floras of the globe or of any of the regions thereof as contributions to knowledge. To this end it must have adequate herbaria, laboratories, libraries and other equipment. It may have extensive museums of both scientific and commercial interest, both technical and popular. Its records of one kind and another constitute permanent and indispensable archives.

In herbarium and library, in particular, it develops special strength. Public general herbaria adequate for investigation and capable of affording a basis for important publication are not numerous in this country. Omitting those developed primarily to represent the State or the region and connected with a State institution or similar center, the following cover the outstanding general well-known collections in the United States: National Herbarium, Washington; Herbarium of the New York Botanical Garden, New York City; Harvard University collections represented in the Gray Herbarium and Cryptogamic Herbarium at Cambridge, and the Arnold Arboretum Herbarium at Jamaica Plain; Herbarium of the Missouri Botanical Garden, St. Louis; collections of the Academy of Natural Sciences in Philadelphia; and Field Museum of Natural History in Chicago.

Botanic gardens originate in two ways: By

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private initiative and endowment, in which case the wishes of the founder prevail, and these foundations eventually become corporate and take on a public character; by direct contributions from private and public sources, in which case the institution becomes at once a semi-public, public, or civic enterprise.

II. The Purposes, Plans and Property of a Botanic Garden

We have learned that a botanic garden is an organized collection of growing plants, together with the necessary libraries and museums and laboratories, made and maintained with the intention of diffusing botanical and horticultural knowledge and interest. It is, or may be, a form of community expression, as much a part of the civic patriotism as an art museum or public library.

A botanic garden is not a park, although it may be a landscape. It is not a pleasure-ground although citizens may derive limitless satisfactions from it. It is not a collection of plants with labels. It is not an adjunct to a building or even to a college or university although it may be directly affiliated with a university, or if it is the property of a university and under its administration it is a department thereof rather than an incident to some other enterprise. It is not a show ground or exhibition stand, although display and exhibition may be

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legitimate parts of its activity. It is not a mere collection of anything.

Its directorate should be in the person of a professional man, as assuredly as in the case of the city schools or a university. It should be clearly separate from politics of every name and breed. It should be an integral part of the scientific, educational and art development of its territory. It has a constituency to serve.

The botanic garden of this kind should have its own corporate existence, that it may serve its particular purpose. Yet it should also have intimate affiliations, sometimes through representation on its board of trustees, with whatever other foundations or establishments in the region that may have cognate aims, interfering with none and duplicating nothing, as the park system, schools and institutions of learning, scientific and professional bodies, historic and art societies, garden clubs and other agricultural and horticultural groups, hospitals, churches and civic bodies, commercial organizations, governmental agencies. These affiliations will be profitable only if the director and staff, supported by the trustees, are not only professionals and specialists but desire to identify themselves with the life and progress of the community.

Perhaps no given botanic garden can operate effectively in all the endeavors suggested in these outlines, for there are always limitations

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and local hindrances and nowhere are adequate funds available; it is legitimate for any such garden to emphasize a special line of activity; but these various directions are nevertheless the legitimate activities of such an institution and the nearer it comes to their fulfilment the greater will be the satisfaction of the community in it and the more extensive will be the development of such foundations in the future.

In most cases a botanic garden may probably be safeguarded from politics and sudden pressures or waves of public opinion by close affiliation with an educational institution or a scientific body of high standing. As it is an educational and scientific institution, a university or college connection should be to its advantage. It may be related to a park system, provided its staff, policy and funds are administered by its own board of directors. A good relation of this sort is that made between the city of Boston and the Arnold Arboretum of Harvard University whereby the city becomes responsible for the roadways and walks, policing and taxes in return for the free opening of the arboretum grounds to the public. This relationship is explained by the Director of the Arboretum, Dr. C. S. Sargent, as follows. (Standard Cyclopedia of Horticulture, 349): "In December, 1882, a contract was made between the university and the city of Boston under which the city agreed to add certain

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adjoining lands to the arboretum, to construct and maintain under the direction of its park commission a system of carriage-drives and walks planned under the direction of Frederick Law Olmsted, to police the grounds and to assume all taxes which might be levied on the property during the thousand years for which the contract was made. In return for this assistance, the university agreed to open the arboretum to the public from sunrise to sunset during every day of the year, reserving, however, entire control of all the collections and of the grounds with the exception of the drives and walks."

Because of its attractive character, permanence, space and openness, as well as its refined and studious atmosphere, a botanic garden may well be one of the places in which some of the municipal or other institutions may be built, as a scientific and artistic center. It should provide a good setting for a natural history museum, comprising collections of geological specimens, birds, insects and other animals, plant groups, landscape and similar paintings. It may well provide an appropriate background for an art museum. A commercial museum should be eminently in place in such an area; such museums will be increasingly important as the demands of manufacturing and merchandising multiply and as industrial needs must be more and more met by means of new

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materials and substitutes. These museums, already well known, will be needed in many places to assemble the materials of manufacture, transportation, materia medica, and to meet the local needs of education and supply.

Having taken a general view of the function and scope of a botanic garden, we may now range these purposes under definite heads and consider a few of the details; and thereafter we may enquire as to the acreage. I think we may appropriately consider these purposes under ten divisions.

1. *To popularize plant knowledge directly.*—A botanic garden is itself an influence. It should also be an enlightening and stimulating force throughout its region in respect to natural history, nature-study, gardening. It should in some way try to reach every home with a love of plants and with instruction for their care. To this end it may aid all garden clubs, scout and camping groups, botanical and other societies.

The popularization of plant knowledge may be attained directly by means of these affiliations with established and spontaneous groups, large and small. It may also be spread by means of popular lectures, loaned lantern slides, simple untechnical publications, and sympathetic coöperation with the press.

2. *To conserve the native life of the region.*—The institution is not a “garden” in the sense

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that all its area must be under formal cultivation. It is naturally a preserve and refuge, if its area is sufficient and the location is fortunate. The ideal establishment is one in which a considerable area of wild land is available, becoming what may well be called a natural garden. The native plants, birds, to some extent the mammals, the water life, the natural configuration, the significant geologic features, may all be protected.

A botanical institution of this kind may quicken the exploration of its region for plants, birds and other animals, rare localities, choice bits of scenery, and at the same time aid powerfully in preserving the wild flowers and other natural features. Without active effort at local conservation we shall soon lose much of the charm of the wild and free places, with the growth of population and the propagation of indifference to native surroundings.

There may be branch gardens or protected areas to maintain unique preserves here and there. It is to be expected that many little properties containing interesting natural features and historic mementoes would be devised to such an institution for safe keeping in the course of years. Every region now needs such a dependable conserving foundation, before the monuments, records and native character are lost.

3. *To preserve historic plants and species*

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and varieties.—We ought not to overlook the preservation of historic species and varieties of plants that once were of great service but which are in danger of loss through change in fashion or taste, difficulties of propagation, or neglect. This is particularly true of some of the old varieties of orchard fruits, that we ought not to lose and which are not to be had of nurserymen or experiment stations. In respect to the apple I suggested this subject in "The Apple-Tree" (p. 77-78), a little book that was written for the amateur, who is the lover (not the beginner or the tyro, as we mistakenly use the word:¹ "Naturally, the nurseryman cannot grow trees of all the good apples that may be wanted. The experiment stations cannot maintain living museums of them, for their function is to investigate rather than to preserve. Arboretums are concerned with other activities. Is there not some person of means, desiring to do good to his successors, ready now to establish a fructicetum *in perpetuum* for the purpose of preserving a single tree that a record may be kept and that amateurs may be supplied with cions thereof?"

4. *To provide a test ground for plants*

¹ I have been interested in this suggestion of the apple trees as a test of public concern in such subjects. It has been purposely repeated in various ways on the platform in many parts of the country over many years, and it was published in the book in 1922. I have never had any indication of curiosity about it on the part of anyone.

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adapted to its territory.—We need to try the new things in ornamental and other plants in every climatic region, and where they may be accessible to persons without laborious or expensive travel.

It is evident that many parts of the United States must find new sources or types of plants if they are to make the most of their planting. Perhaps many of these plants must be brought in or developed from the wild, and we must learn how to grow them and utilize them. Just now, for example, there is great interest in rock-gardening. It is apparent that in many parts of the United States the usually recommended rock plants will not thrive. Yet there may be native rockeries in the region, along rivers and cliffs and perhaps in old quarries, that nature has attractively clothed; a study of these conditions might yield a new and charming type of rock-gardening.

It is legitimate for a botanic garden to engage in plant-breeding. Its abundant collection of growing material should make such work very hopeful.

The testing of novelties and introductions leads directly to exhibitions. The exhibitions are of two kinds, (1) those staged in a hall or pavilion at a certain epoch; and (2) those of a permanent or seasonal character growing in the garden, in which old and new kinds are exhibited, as in a sweet-herb-garden, rose-

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garden, winter-garden, spring-bulb-garden, gladiolus-garden, lily-garden, perfume-garden, drug-garden, water-garden, color-garden, fern-garden, rock-garden, lilac-garden, phlox-garden, sunflower-garden, kitchen-garden, salad-garden, grape-garden, economic-garden. Exhibitions of whatever kind, representing progress in plant-growing, should be of great service not only to citizens in general but to commercial gardeners and florists.

The utilization of worthy novelties on home grounds and in landscape gardening demands stimulation. In these days of quantity-production of standardized products we greatly need the offset of variety in plants; never has such variety been more desirable than today.

5. *To introduce new species to cultivation.*—We are beginning to realize that even with all the exploration of the earth there are great regions yet to be diligently searched for plants adapted to cultivation. The botanic garden cannot take the place of the nurseryman, but it may supply him and other agencies with new and noteworthy material. A noble example of this kind of effort is the Arnold Arboretum, which has introduced extensively from remote regions and is making the plants known to the public. The late Director of this institution, Dr. Sargent, exhibited striking ability in this direction and his services to horticulture as well

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as to botany will be increasingly appreciated as time goes on.

6. *To train gardeners.*—One of the regrettable tendencies in American horticulture is the decrease in trained or apprenticed gardeners. If the home is to retain its quality we must have plant-growers who follow the occupation because they love it and not alone for commercial ends. We need gardeners well trained in the technique and practical skill at the same time that they have a rather broad working knowledge of plants; and we must have them living the life of the true amateur.

In this country we are deficient in institutions and agencies for the training of gardeners, although we have several good schools. A botanic garden naturally provides a background of much and varied plant material, and its atmosphere of education and research should have a salutary effect. If a botanic garden is to stimulate home and estate gardening, it should also help train persons to grow and utilize the plants.

7. *To supply an adjunct to the schools.*—A botanic garden may furnish material for class use in schools, provide lectures and lantern slides and specimens, develop exhibitions, further nature-study, lead outdoor activities, supervise teaching when desirable, provide laboratories to which pupils may come on assignment. In such cases the board of educa-

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tion may make a direct annual maintenance appropriation, and the garden then becomes, in one phase of its work, a part of the school system.

The Brooklyn Botanic Garden may be cited as an illustration. It coöperates extensively with the public and private schools and receives appropriation for this and other reasons from the city of Brooklyn. In addition to its scientific staff it maintains officers for the special work of instruction to visiting classes from schools as well as to regular botanic garden classes. It has a greenhouse devoted to pupils (both children and adults), where they may undertake propagation of plants and other exercises. In 1925 conferences were held with 505 teachers, representing 24,164 pupils. Study material was supplied to 2,279 teachers, representing 162,585 pupils. Thirty exhibitions were held. Over 19,300 living plants were placed in class-rooms of 112 schools. Seed-packets were distributed to 204,325 children. The number of pupils brought to the Garden by teachers was more than 58,800.

8. *To maintain research.*—With all the funds and energy devoted to original investigation in recent time, we are yet only touching the borders of the unknown. In all science, the uncovering of one fact, phenomenon or principle only discloses others. Each investigator approaches the subject in his own way and with

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his own experience and equipment, and there need be no fear of duplication. If we had ten times the present research in any branch of science we should even then be only beginning the great privileges that lie before the human mind. Mental and social growth are conditioned largely on the freewill and the consecration with which we undertake to discover and to comprehend the world in which we live.

A botanic garden is one of the many agencies that may competently engage in research; and such effort keeps the institution virile, progressive, and able to speak with authority. Every agency engaging in real investigation is an immeasurable asset to the courage and outlook of a community.

Any subject connected with plants is within the sphere of a botanic garden. It may lie in the region of taxonomy and floristics, ecology, phytogeography, genetics, physiology in its broadest sense, pathology, horticulture, and all the philosophies that register our understanding of the vegetation of the earth.

The maintenance of our industrial prosperity also rests directly on continuous investigation and discovery. A good part of commerce is concerned with plants and plant products, and in these fields patient research must be kept as much alive as in other phases of current welfare. We shall always depend on vegetation as a source of supply.

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9. *To publish.*—If all these things are true, it follows that a botanic garden must have voice by means of publication. One series of publication may be brief and non-technical for use in gardening, school work and other popular undertakings; another series may carry the contributions to knowledge.

All the established botanic gardens and arboretums in the country are publishing institutions.

10. *To coöperate with other similar institutions and agencies for the extension of botanical and horticultural knowledge.*—At no one place can all the plants serviceable to the United States or North America be grown. It is part of any adequate horticultural program to find the regions and places of most perfect adaptation. This requires an arrangement with all institutions and gardens that are able to make tests. The United States Department of Agriculture has several test grounds, in different parts of the country, for such use. Some of the experiment stations have important growing collections. The Central Experimental Farm at Ottawa is a noteworthy testing ground and it distributes to other grounds in the different parts of the Dominion. Many private estates and commercial establishments would be glad to coöperate in such work, testing for their region, and such effort is already under way. Some of the city parks might become assem-

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bling grounds of the new things in a contributory spirit. Some of the parks now maintain large botanical collections, as Golden Gate Park, San Francisco, Garfield Park, Chicago, Highland Park, Rochester, to mention only three. A coördinated effort to develop such a linkage throughout the country should produce outstanding results.

Now your minds are full of questions. You want to know how much land this institution must have, how many buildings, how large a staff, how much it will cost. Of course these questions cannot be answered definitely, for every foundation is a problem by itself. Yet a few examples may be cited as illustrations. The costs we may omit, for I am here attempting only to express an idea and not to make specifications.

If an institution is a good one, it will need more than it has. It will be reaching out to new services. Given a good staff, the product of a botanic garden, as of any other institution, depends on its physical facilities, and on the funds and the freedom with which they may be used.

The area should be liberal, for additional land is difficult to secure, and extensions are likely to be cramped or else not connected with the original development; and it is difficult to foresee the needs of the future. If the area is

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several hundred acres, it need not be all developed at once: unimproved parts, if the property is large enough, may be left permanently as a wild life and scenic preserve. It is practically impossible, within reach of a large city, to obtain too much land in the beginning. If a well developed arboretum is contemplated as part of a botanic garden, the area must be ample, particularly if an actual forest is to be included; I should hope that such an institution might have 1,000 acres, and more than this would be desirable. All the original areas of botanic gardens are too small for present needs.

On the other hand, much may be accomplished on much smaller areas by restricting the plan and by intensive development. The purpose of the institution, as defined in its charter, will largely determine the extent of land. Mere bigness is not an asset.

The Missouri Botanical Garden has 75 acres in the city of St. Louis; 50 adjoining acres were sold to provide funds for securing an adequate acreage outside the city. This new area—the Gray's Summit Extension—has now been purchased, comprising 1,300 acres running two miles along the Meramec river; in this purchase the native flora is unusually well represented. The institution has affiliation with Washington University through the Shaw School of Botany. The New York Botanical Garden is a little

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under 400 acres, all in Greater New York; more land would be desirable. It is part of the New York park system although maintaining its own control and management, and is affiliated with Columbia University. The Brooklyn Botanic Garden has 50 acres. It is a department of the Brooklyn Institute of Arts and Sciences. The Arnold Arboretum of Harvard University has about 260 acres and is still limited in its area. The Morton Arboretum at Lisle, Illinois, has an area of 400 acres. It is an independent institution, established by Joy Morton, son of the founder of Arbor Day. The Boyce Thompson Southwestern Arboretum at Superior, Arizona, has approximately 400 acres under fence. It is recently instituted by the founder of the Boyce Thompson Institute for Plant Research at Yonkers, New York.

It is passing strange how little the botanic-garden idea has taken hold of the imagination of those who desire to found institutions and benefactions. No other foundation, perhaps, is capable of so completely representing a region to the public.

We have reason to expect that one city in each geographical area will take the leadership in such a development. We do not yet realize the obligation of a great city to its geographical background. The best leadership in such a background must be based on the natural history of the region.

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Quite another class or group of botanic gardens is likely soon to develop in the United States, in connection or association with the institutions of higher learning. These gardens will tend to be more than areas for the growing of material for class use, or than decorative features of a campus, and will become laboratories for research. They may be expected to have definite programs of their own and with funds set apart for their special service. At the same time they will provide a powerful stimulus to undergraduate teaching. I look for the development of such botanic gardens as a definite expression of phytological study, and anticipate that in time they will affiliate themselves into some kind of national society or gathering for the discussion of ways and means common to them all; this should provide another useful contact of institutions of learning.

III. The Ulterior Results

The results that may be attained by a botanic garden, beyond the diffusion of technical knowledge, are implied in all that has gone before. The reader will not need further details; the imagination can fill in the picture as it will; and in the end the results will be determined by the ideality of the directorate of the institution.

The public needs are great. We need, for example, to find means to utilize our leisure. We are now well past the pioneering stage.

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The best use of leisure must be developed where we live, which is at home. Any species of education that opens the mind to beauty, that puts us in contact with nature and natural objects, results not only in personal satisfactions but has great social value.

We manifestly need an offset for the excessive commercial education of our day. We must find a corrective in the study of history and literature and men, to which should assuredly be added the study of nature. The reverential attitude should be developed in the children.

Every soul should be put in contact with the mystery that stands stark before us but which we do not apprehend. It is in every leaf, every tender shoot, every opening flower and growing fruit, every pulse of life on the planet. The wonder of life is the greater as our knowledge grows. The mind may have boundless resources if it will.

We should hope that all persons may develop an artistic expression of life. This expression is founded on the recognition of beauty, of the beauty that inheres in forms and colors and fragrances, that lies in fitness of means to ends, that is an attribute of every natural living thing; it may sensitize every emotion.

12. *The Goals*

The Exhibition was exuberantly attractive, both in the mass effects and in perfection of the details. The organization and administration were precise. The quality was up to standard. It was on a big scale. Visitors came in throngs. The press gave it much space. On every side it was pronounced a striking success. It was a social and commercial event.

Indeed the Exhibition was striking. Such blaze of color and bewilderment of design had probably not been staged before. Great skill was expressed in the growing of the plants and in the handling of them under unfavorable weather conditions. The garden displays by prominent persons, with trained gardeners, were faultless. The exhibits were both personal and commercial, with interesting displays in many new and attractive accessories. Everywhere was evidence that plant-growing is now appreciated by the public and that the commerce of it is recognized as an important trade asset. Except in a few details here and there suggested by experts, and perhaps in

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quantity, it was difficult to see how the exposition could be improved. Enthusiasm, amounting almost to jubilation, was instant in the enterprise.

It was apparent, but perhaps unrecognized, that the Exhibition was a competition in vogues. It was indeed a show. The ranges of plants were naturally those now popular or at least so striking as to fill the eye with color. Roses properly held first place, with orchid bloom an outstanding feature. Little evergreens, bay trees, nephrolepis, callas, lilies, cinerarias, narcissi, astilbe, amaryllis, cyclamens, marguerites, acacias, primulas, heliotropes, and others, were in perfection. Good plant-breeding was in evidence. One was impressed with the pride of the exhibitors in their work, and the ready response to the encomiums. It was frequently remarked that horticulture has now attained to something like perfection; at least, persons were lost in the wonder of it.

Good diversity was evidenced in the cut-flower material and in the made-up pieces. Variety is now noteworthy, since orchids have become a reality as cut-flower subjects; the new place of orchids in the trade is one of the marked departures of recent years.

The Exhibition was worthy all praise and it was given without reserve; yet I could not place myself in it, who had not wealth or

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position nor any goods to gain; and others seemed to be looking for something they could not find, some nook or humble stand to which they could attach their plain affections. One thought of the man (or woman or child) who grows a good plant just because he wants to, even though it is not mentioned in the lists or might not elicit praise or a paragraph in the newspaper or even find a comfortable place in a fashionable show.

Let us have more of these great displays; may we not also have good exhibitions of plants, vegetables and fruits grown actually at home on small places, giving particular emphasis to those propagated and raised from first to last by the garden lover himself or herself? I found myself wondering what will be the shows one hundred years from now, assuming that there will be exhibitions then. What will be the premium lists? Will these classes of plants then be dominant? And what will be the measures of taste and accomplishment?

The exhibitions do not express the state of the trade or the occupation. They are perhaps precluded from expressing it by the fact that they are exhibitions. The status of the occupation is indicated by yearly records of average and total production and performances; statistics is now the favorite method. When all the records of exhibitions are compiled and compared we shall not know the welfare con-

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ditions of those who follow the occupations that the exhibits represent; this, of course, is not the fault of the displays. The welfare of the occupation is conditioned by many factors that exhibitions, as now conceived, cannot recognize or display. The state of the business is likely to be determined by the synchronism of many factors and movements, sometimes so closely interlocked as to baffle ready analysis. It is supposed that the ups and downs, the good times and the hard times, are recurrences at more or less regular intervals; but whether there are true cycles that move in orbits is a question of economic theory on which we need not hazard an opinion; probably we do not yet possess comparable statistics over a sufficient length of time to enable us to answer the question. Perhaps enough has been said to suggest that exhibitions, even at their best, do not really represent the condition of the vocations and trades on which they rest.

* * *

In other times the goals or posts were set to which the runners ran; and the stakes could be moved ever forward. The goals are in the mind's eye. It is not enough to be successful. Every success is but a step in a continuing conquest, and it does not follow that the succeeding step is to be only an improvement on the last; sometimes it must take a new direction. We

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wish we could set our minds fifty years ahead whenever any enterprise of great importance is undertaken; then would the element of prophecy be in it. The past we assuredly must know, and memory gives us our direction; but the face should be toward the future. In this spirit let us consider certain factors in our horticultural situation, to supplement the estimates that have been made in other essays in this book, referring to the United States alone.

It is easy and pleasant to congratulate ourselves. This is a prime result in many of the horticultural meetings. I too might pile up statements of our great accomplishments; yet we may pause now and then, in what is still essentially a new country, to consider that we shall not have a great horticulture until we pass the epoch of infectious dealing in real estate. The best horticulture is an expression of settled homes and communities, and not an embellishment for the advertizing of property. We know we are a great people, doing things in a large and bold way; we cite our hospitals and foundations for medicine, agencies in engineering, for many of the arts and sciences, for library service, for the study of social and political problems; yet we have no sustained and outstanding foundations with the expressed intention of discovering true horticultural knowledge in the kinds and adaptations of

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all kinds of plants. We have not visioned the field; much new effort awaits us.

The United States of North America undoubtedly has the widest range of conditions for plant-growing of any country under one language and one government. The area covers the northern latitudes down to practically tropical surroundings, with all the ranges of elevation besides and the greatest variety in soil and rainfall. This fact provides our people an outstanding opportunity and likewise imposes a heavy responsibility to develop plant-growing to a high degree of perfection. We are proud of the accomplishment, and the epoch has not been long. But on the horticultural side we may suggest certain deficiencies.

At the outset let us admit that mankind so far has made effective use of but a small part of the vegetable kingdom, a subject discussed in the Botanic-Garden article. But even so, it is astonishing that we have practically no adequate and recognized records of all plants actually in cultivation. Numbers of species and marked botanical varieties are introduced to cultivation year by year; some of them persist, some pass out; others vary into interesting forms; yet we make no sufficient archives. What will our successors say of us?

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A published list or a catalogue of the species in cultivation in any time or in any plantation is not a record, for it may not be known whether the names really belong to the plants. One of the perpetual problems before the student of these subjects is to correct erroneous determinations even in standard lists. Not even registration, of which we now hear so much, is a record unless perhaps of mere horticultural forms and even then there is likely to be ambiguity and doubt.

The one real record is the plant itself, properly preserved. The only way of preserving plants competently is by good modern herbarium methods. Unfortunately, most of what little popular instruction has been given in herbarium-making has been so trivial and has seemed so meaningless that the subject has fallen into disrepute or even into contempt. Specialists in biological work who have not kept step with the progress in the subject are often ready to condemn it. Again, the development of regular herbarium work has not provided for the incorporation of cultivated plants, as such, as part of the vegetable kingdom. In the history of these subjects the botanist and the horticulturist have belonged on different social and educational planes, and these divergencies, even if unconscious, have conditioned much of the perplexity of the present day.

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Nowhere, in these systematic lines, have botany and horticulture really come together on any sufficient basis, and yet these fields are only departments of the one great subject of phytology.

An herbarium is a card index of the vegetable world, with the plants mounted on the cards. It makes a record as permanent as the paper on which the specimens are placed. In connection with proper labels, notes, photographs, and other means, it becomes an illustrative record of the epoch it covers and a requisite archive and reference for careful work in plant-breeding, ecology, and any number of other lines of study. It is indispensable to the best progress in horticulture. Adequate library and other collections should go with it. This subject is discussed in the article named "Candytuft" (the most important chapter in the book, but which will be the least read). Here is a large, fascinating and important field. Of course the discriminating reader knows that an herbarium of record, ever so clever and good, is not sufficient. It should itself be set in a garden against the wild, all devoted as a single enterprise to the critical study of living plants with the assurance that the cultivated flora will receive adequate attention. In the interest of science and of welfare at least one non-governmental foundation of this nature should be provided in this great country, of equal standing with

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botanic gardens, endowed societies, and other progressive enterprises.

The study of cultivated and domestic plants should proceed in connection with the investigation of native plants. The two groups are only phases of one subject; cultivated plants cannot be separately understood—they must be studied by the systematic methods of accuracy that are employed for the wild ones and the student should receive early training in the field as well as in the garden; we are deficient in these respects. The cultivated flora is at least as significant as the native and it has not been studied in the same critical spirit and the knowledge of it is not exact. There are exceptions to this statement in certain groups, particularly in the woody plants, but as an enterprise we are sadly in lack. We are particularly in need of herbaries to supplement arboretums,—since there is a developed practice of devoting special institutions to the study of trees and shrubs; the herbarium is not yet recognized amongst us as an enterprise. Fortunately, this field has now been entered by the Botanic Garden of Harvard University at Cambridge, and the effort deserves encouragement and support. Horticulture as a subject must rest on a scientific basis; the first requisite in this basis is a critical body of knowledge on the kinds of plants in detail; and this knowl-

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edge must be usable by those who devote themselves to researches in any department of the subject, to the end that analytical observation may be developed and that they may know their material.

The need of clear identification is specially urgent now that physiological and genetical studies are developing in relation to the species-concept. In the character, number and arrangement of the chromosomes, particularly, we now hope for aid in testing the validity of some of the supposed species. Yet such studies are of little significance to the systematist unless the author has taken pains to have his material critically identified. The studies are likely to be undertaken in difficult or variable genera in which the need of careful determination, perhaps by an expert, is specially important; sometimes the particular strain or variety of the plants with which he works should be a matter of record; and in all critical groups, good herbarium specimens should be made for record and verification.

Nor can we be silent on the subject of horticultural literature, although we here approach dangerous ground. The horticulturist now has surprising aids in the writings in periodicals and books. The printer's art has embellished

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it. But our literature, on the whole, is not of a high order or fundamental in conception. The best of it is capable of betterment. A new literature is developing in the technical-science aspects of the subject, but it has not yet found its way into books to great extent except, perhaps, to be quoted or cited. Monographs in major subjects or groups from the horticultural point of view, and still thoroughly scientific in method and treatment, are yet little known amongst us. Literature on the commercial aspects of horticulture is necessarily relatively transient in application, because trade conditions are subject to rapid change. Some of the current writing is hardly horticulture, however it may be entitled. In the United States we do not yet have a sufficient constituency to encourage the publication of many horticultural books of permanent value; nor are there periodicals or proceedings in which what we might call contributions to knowledge in horticulture can find proper publication. The usual bulletins of the experiment stations (excellent, and becoming better) are naturally not of this character, and of course they are available as mediums of publication only to the staffs of the given institutions. The recent development in these institutions of series of memoirs or technical bulletins to carry the more fundamental publication, is encouraging, but they do

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not meet the requirements of those outside the staffs.

The serious studies in the horticultural and botanical lines are gradually assembling themselves into the institutions. This is to be expected, yet the situation is not altogether reassuring. It would be a misfortune if competent persons outside the institutions should feel disadvantaged in their studies, or if we develop an institutional mind in respect to these subjects that are by right the concern and the joy of the people, that is to say, if we should lose the amateur. It would be a calamity if all investigations should be obliged to wait on "projects" of institutions, or be held in abeyance for "facilities," or be approved or edited by committees, or be subject to supervision of "authorities."

We are here approaching the tender subject of education. The subject is not to be discussed now, for I am disqualified by my own shortcomings in this field; but perhaps I may be allowed to say that education for horticulture has not yet reached its fulfilment even though we are making good progress.

One phase in the educational field, however, may justify a few sentences. This is the extension of horticultural knowledge more effectively into every village, suburb, ward, hamlet and

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neighborhood, and in the open country, with the assembling of local gatherings for the furtherance of better home and civic surroundings. Caution should be exercised in the matter of community action, for the more complete and formal the organization the more is it likely to estrange those who may most need encouragement and the greater is the likelihood that it will be utilized by persons who desire to attain local prominence. Professional or technical education for commercial growers is relatively simple and easy, but this other field requires great skill. Horticulture is or may be a powerful part in the development of good homes in any place or climate where men ought to live. Its development should be closely associated with good outdoor housekeeping, not only in the personal premises but in all public and semi-public places. It should result in clean-ups and civic improvement. There is here a range of public education that we touch only lightly and without momentum, yet it is in very fact a background necessity if we are to occupy the earth satisfactorily. Consider the extent of cottage-gardening in England and elsewhere, and answer whether we have yet attained the goals.

This country has not had a great horticultural book under the support of a patron of the subject, nor has a large piece of horticultural

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investigation been matured on an adequate and permanent endowment. Books are now commercial undertakings and they are therefore limited in scope, artistry and value. We forget that outstanding works were published one hundred to three hundred years ago. Where is the present-day Besler or Parkinson or Miller or Jacquin or several others? We have not had a scientific or altruistic organization publishing noble horticultural monographs. We search the annals of academies and institutes in vain for illustrious work in horticulture. And for such work the institutions do not train the men.

It is not implied that the greatest thing in horticulture is a book or a monograph. The greatest subjects are plants. But what we learn from plants and feel for them may be recorded in books, and the printed page therefore becomes in a very real way a measure of the horticultural status at any period; and every scientific investigation sets us forward on our way in both amateur gardening and the horticultural trades.

Of eminent private places we have had many. For a life-time or less great growing collections of species and varieties are assembled, and then they are commonly dispersed or neglected; and in the meantime no

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great contribution may have been made to the public understanding of plants. The privilege of assembling these collections, as also of books and works of art, properly imposes an obligation. The possibilities of such establishments for scientific work are unimagined. Of course there are exceptions; yet one is likely to be so overcome with a sense of depression or even of sadness in the presence of these great collections that in the later years I have avoided visiting them.

* * *

We take pride in the advancement in horticulture in North America. We have skillful growers, enterprising periodicals, extensive establishments and we properly rejoice in great commercial attainments. I am impressed with the excellence of the horticultural work in the colleges of agriculture and the experiment stations; it has been my privilege to live in the era in which every one of these enterprises has developed, with the commanding body of well-trained specialists. Landscape gardening, mostly under its current title landscape architecture, has brought form and artistry into the planting, so much so that all of us are now conscious of the need of proper plans and layouts. The dealers and commercial growers and societies contribute in many ways to education and general betterment, as witness the publica-

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tion of "Standardized Plant Names." But the reader must not feel that all the victories have been won or that the goals have been passed. The primary necessity is more accurate and extended knowledge of the species and forms of plants, their special requirements, characteristics and best utilization; this implies a good Horticultural Ecology; all the technical physiological studies follow as a matter of course. There are many conquests yet ahead of us in the United States; we shall attain them in due time if we recognize the need.

We are wont to rely on mere publicity or propaganda. The first requisite is ever more knowledge, and the acquirement of it is always personal and does not rest with committees.

It is a wonderful world in which we live and vegetation is the garnishment of it. It is a marvellous experience to see the manifold forms of life emerge from the bare earth, all the greater because we do not recognize the sensation. As we are inhabitants of the planet it surely is our part to appreciate and utilize the objects and incidents with which we are placed. The interest in them, and their meaning for us, lies in their essential nature and in the fact that they are partners, and the sense-sensations of color and fragrance are only attributes. The seasons are an integral part of life; to one who loves the seasons, the garden is the best personal expression of them.



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